Spring2008

UNDERSEA WARFARE

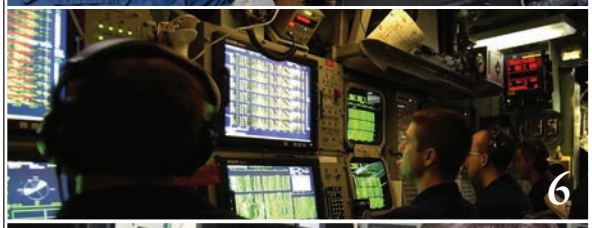
U. S. SUBMARINES... BECAUSE STEALTH MATTERS

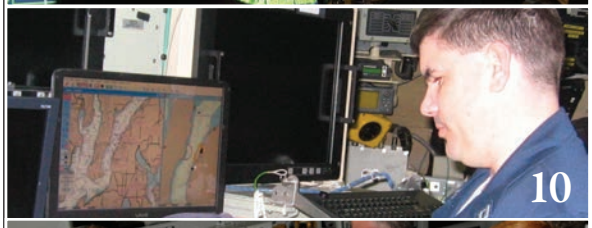
Battle Ready

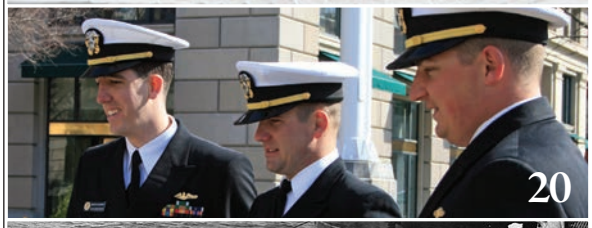
U.S. Submarine Capabilities Prove Ready For Any Threat

INSIDE

Spring 2008
Issue No. 37







UNDERSEA WARFARE

THE OFFICIAL MAGAZINE OF THE U.S. SUBMARINE FORCE

Battle Ready

U.S. Submarine Capabilities
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Features

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On The Cover

An SH-60 assigned to the "Indians" of Helicopter Anti-Submarine Squadron (HS) 6 hoists Brig. Gen. Simeon Trombitas, commander of the Combined Special Operations Command Joint Task Force Korea, from the deck of the guided-missile submarine USS *Ohio* (SSGN-726). *Ohio* is on a one year deployment to the 7th Fleet area of responsibility.

Photo by Petty Officer 2nd Class Barry Hiramaya

"This spring was an exciting time in the Submarine Force with a new *Virginia*-class submarine being added to the Fleet, the final SSGN being returned to service and another SSGN embarking on her maiden deployment. And while new ships are being built and commissioned, our third *Virginia*-class submarine, USS *Hawaii* (SSN 776), returned from her first operational deployment. This spring continued to bring great opportunities to the Submarine Force both at home and abroad."

VADM Jay Donnelly, USN, Commander, Submarine Force

In April, I had the opportunity to travel to South America to meet with both Brazilian and Columbian military leaders. We exchanged ideas and looked for areas of increased cooperation as we continue to engage with partner nations to support the Maritime Strategy. As joint participants in the Diesel Electric Submarine Initiative (DESI) and other exchange programs, our forces train together to develop the relationships necessary to advance our countries' shared interests. These exchange programs have also played a vital role in strengthening the foundation of regional security in the Americas.

Back at home, the integration of the first four SSGN submarines into the fleet is continuing with great success. USS *Georgia* (SSGN-729) held a return-to-service ceremony in King's Bay in late March. USS *Ohio* (SSGN-726) is midway through her first deployment in the Western Pacific. Additionally, USS *Florida* (SSGN-728), departed on her maiden deployment as an SSGN in April. We now have two SSGNs forward deployed with a primary mission of providing a covertly positioned, quick response, large volume strike platform. This two-ship forward presence will continue for years to come.

With the challenge set by the Chief of Naval Operations of a two-ship per year procurement rate by FY12 for the *Virginia*-class submarine, Northrop Grumman Shipbuilding and General Dynamics Electric Boat continue to work as a well-coordinated team to provide us with high-quality submarines.

The next two *Virginia*-class submarines to celebrate milestones are *New Mexico* and *New Hampshire*. A keel authentication ceremony for *New Mexico* was held on April 12 at Northrop Grumman's Shipbuilding sector in Newport News, Va. and *New Hampshire* was christened in Groton, Conn. on June 21.

Our fourth *Virginia*-class submarine, USS *North Carolina* (SSN-777), was commissioned May 3 at a very well-attended ceremony in Wilmington, N.C. with Secretary of the Navy Donald Winter as the featured speaker.

In late May, Exercise BOLD MONARCH 2008 (BMH 08), a live submarine escape and rescue exercise, was held in the Northern Skagerrak area of Norway. During the two week exercise, three submarines, one each from the Netherlands, Norway and Poland, were bottomed to simulate sinking. Support personnel and equipment from Canada, France Germany, Greece, Israel, Italy, Netherlands, Norway, Poland, The Russian Federation, Turkey, Ukraine, United Kingdom and United States worked together to solve complex rescue and medical problems in a variety of demanding scenarios. SUBDEVRON FIVE was instrumental in coordinating the successful flyaway and installation of the Submarine Rescue Diving and Recompression System (SRDRS) onboard the USNS *Apache* (T-ATF-172) in Stavanger, Norway.

This phased exercise culminated with a large scale coordinated rescue and evacuation of survivors from a disabled submarine.

This spring I also had the privilege of seeing many of you at our Submarine Birthday Balls honoring the significant legacy of our Submarine Force during its 108 year history. I had the opportunity to speak at a few of the events, where I conveyed some of the heroic achievements of World War II submarine legend, Rear Admiral Eugene Fluckey, and the Cold War heroes onboard USS *Batfish* (SSN-681). It is important to remember that the rich heritage of our Submarine Force today was forged by the professionalism and dedication of our predecessors.

I am certain that our submarines will continue to be in very high demand, and it's our job to ensure they will be ready to perform any mission tasking while deployed. Day-in and day-out, our crews gather intelligence and shape the environment to help to avert the next conflict. Yet, if necessary, they stand ready to engage quickly and decisively. That is why I remain so proud of our Submarine Force.

"Our role is undeniable across the full spectrum of operations that provide strategic influence, national level intelligence, critical information supporting the thorough understanding of the battlespace, unique capability in the War on Terror, and significant capability in support of combat operations."

RADM Cecil Haney, USN, Director, Submarine Warfare

Greetings from our Nation's Capital! I consider it an honor to serve our great Navy as the Director, Submarine Warfare Division (N87) on the CNO's staff. I intend to focus my efforts to build upon the remarkable success achieved by my predecessors to provide our nation with credible and capable combat capability to support our Maritime Strategy.

In my previous role as Commander, Submarine Group TWO, and now in my current role, I see not only the near real-time products our force delivers on a daily basis, but also the wide-ranging effects that our deployments and patrols provide. From Intelligence, Surveillance, and Reconnaissance to the War on Terror to Strategic Deterrent patrols, our efforts are highly recognized and regarded. Our role is undeniable across the full spectrum of operations that provide strategic influence, national level intelligence, critical information supporting the thorough understanding of the battlespace, unique capability in the War on Terror, and significant capability in support of combat operations.

However, there can be no "rest." Other nations continue to move forward to deliver increasingly credible undersea combat capacity and capability and bad actors around the globe continue to want to threaten our democratic way of life. Here at N87, we are constantly evaluating, developing, and working to facilitate the delivery of necessary technologies that will continue to provide transformational capability in maintaining our asymmetric advantage. This includes, but is not limited to, improvements in communications (at periscope depth and deeper), weapon and sensor capabilities, battlespace management tools, Time Critical Strike, Unmanned Aerial Sensors (UAS) and C4I improvements. When coupled with efficient and effective Human Machine Interfaces, innovative tactics, techniques and procedures, and improved training regimens, these enabling technologies will ensure our nation has the appropriate level of capability against the spectrum of current and emergent threats.

This issue focuses on Anti-Submarine Warfare (ASW) and highlights the warfighting impact of our successful Acoustic Rapid COTS Insertion (ARCI) Open Architecture strategy for updating our Combat Control Systems and maintaining our asymmetric advantage. Having recently been to sea on USS *Virginia* (SSN 774) and USS *North Carolina* (SSN 777) and walked the decks of USS *Florida* (SSGN 728), I can personally attest to the awesome capabilities of these platforms. These platforms are bringing transformational capabilities to the Combatant Commander to conduct ASW as part of the diverse capabilities provided by these unique platforms.

We are working diligently with all stakeholders to ensure we are appropriately focused on the right programs that will make a difference. As responsible stewards of our taxpayer investments, we must continue our efforts to improve requirement generation and acquisition from cradle to grave with warfighting effects as the focal point. The process must include clear definition of affordable requirements and increased rigor in controlling costs and schedule. Our ability to better understand the full spectrum of lifecycle costs, investment requirements, and reliability expectations required for new and emerging technologies will ensure a fiscally informed, risk-balanced approach. Our recent successes with the *Virginia* Class cost reduction efforts; the on-time, on-budget delivery of our four SSGN's; and our pioneering Acoustic Rapid COTS Insertion (ARCI) Advanced Processor Build (APB) Technology Insertion (TI) open-architecture program is illustrative of the potential that is possible.

For our N87 staff, I wish farewell to the recently departed: RDML Bruce Grooms, CAPT Mike Cortese, CAPT Stuart Munsch, CDR Dave Byers, CDR Bill Sommer, CDR Rob Thornhill, LCDR Brian Stites, and LCDR Erlina Haun, Thank you for your tireless dedication and service. Fair winds and following seas.

I would like to welcome aboard CAPT Brian Howes, CAPT(sel) Moises Deltoro, LT Adam Zaker, LT Joe Petrucelli and YN1 Martin Irlanda to the N87 team. Also, congratulations to RDML(sel) Doug Biesel on his selection to flag rank and orders to relieve as Commander, Navy Region Midwest. Finally, I want to thank all those in and out of uniform that support the Submarine Warfare Directorate. I know I can continue to count on your support.

UNDERSEAWARFARE

The Official Magazine of the U.S. Submarine Force

Charter

UNDERSEA WARFARE is the professional magazine of the undersea warfare community. Its purpose is to educate its readers on undersea warfare missions and programs, with a particular focus on U.S. submarines. This journal will also draw upon the Submarine Force's rich historical legacy to instill a sense of pride and professionalism among community members and to enhance reader awareness of the increasing relevance of undersea warfare for our nation's defense.

The opinions and assertions herein are the personal views of the authors and do not necessarily reflect the official views of the U.S. Government, the Department of Defense, or the Department of the Navy.

Contributions and Feedback Welcome

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CHINFO Merit Award Winner

Silver Inkwell Award Winner

In keeping with UNDERSEA WARFARE Magazine's charter as the Official Magazine of the U.S. Submarine Force, we welcome letters to the editor, questions relating to articles that have appeared in previous issues, and insights and "lessons learned" from the fleet.

UNDERSEA WARFARE Magazine reserves the right to edit submissions for length, clarity, and accuracy. All submissions become the property of UNDERSEA WARFARE Magazine and may be published in all media. Please include pertinent contact information with submissions.

Send submissions to:

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dear **EDITOR,**

I recently noticed that USS *Miami* (SSN-755) was missing from the list of "Special Recognition—Battle "E" winners in the Fall 2007 / Winter 2008 issue, p. 31 (Issue No. 36). Cmdr. Rich Bryant, showcased on the next page (p. 32), is the Commanding Officer.

Thanks for producing this high quality magazine.

R/
Capt. Rick Breckenridge
Commander, Submarine Squadron-4

Thank you for contacting UNDERSEA WARFARE Magazine and bringing this oversight to our attention. We apologize for not mentioning Miami *and her great accomplishment. Our congratulations go out to her crew on a job very well done! We are proud to have you serving our country. Thank you for your support of UNDERSEA WARFARE magazine and congratulations again to* Miami.

I recently looked at the on-line edition of your magazine, Vol. 1, No. 4 (Summer 1999).

dear **EDITOR,**

In the Downlink Department, I could not help but recognize the photo of the USS *Puffer* (SSN-652) ward room. I served in *Puffer* from March 1971 – September 1974. I would like to offer a correction to the short caption below the photograph. First, the photo was taken in January 1973, not 1974. The boat was in Subic Bay at the time of the photo, and in January 1974, we were halfway through a major overhaul at Puget Sound Naval Shipyard. Capt. John Will awarded me my silver dolphins and Capt. D.L. Cooper qualified me as chief of the watch and In-port Duty Chief. I had the honor of signing a section of Lt. j.g. E.P. Giambastiani's, Lt. j.g. "Little Joe" Henry's, and Ens. Ginman's qual cards. Lt. J.B. Padgett was my division officer for about a year. I knew then that all of these men were brilliant submariners, but I never in my wildest dreams imagined that I was serving with five future admirals. I am very proud that I was a part of their lives and that they were a very influential part of mine.

God Bless the Submarine Force,

Jim Cannici,
Petty Officer 1st Class, USN (Ret.)

sailors**FIRST**

Photo by John Narewski

Petty Officer 1st Class Jason Cook and Petty Officer 2nd Class Mark Cygnarowicz, assigned to the fast-attack submarine USS *Alexandria* (SSN-757) explain the sub's weapons system to country music star Aaron Tippin. Tippin toured the submarine before performing a free concert at Naval Submarine Base New London as part of the Spirit of America Tour.

by Jason W. Cronin

Photo by Petty Officer 2nd Class Barry Hiramaya

SSGN

Deployed and Special Forces Ready

In 2006, the Joint Command and Control for War on Terror Activities (JC2WTA) Joint Test (JT) was chartered to develop tactics, techniques, and procedures (TTP) that enable an embarked commander to command & control (C2) special operations forces (SOF) from an SSGN. The TTP developed by the JC2WTA were refined and fully tested during the project's final field test onboard USS *Ohio* (SSGN-726). The field test was conducted during Exercises KEY RESOLVE / FOAL EAGLE (KR/FE 08), in February-March 2008. KR/FE 08 was an operational-level U.S./Republic of Korea (ROK) training event held peninsula-wide to ensure operational readiness in the Korean theater. These exercises demonstrated U.S. resolve to support the ROK against external aggression while improving combat readiness and joint/combined interoperability.

KR/FE 08 provided a realistic backdrop for demonstrating the viability of a SOF Commander and his battle staff operating aboard an SSGN. These exercises tested the abilities of a trained Combined/Joint Special Operations Task Force (CJSOTF) and a Naval Special Warfare Task Group (NSWTG) to exercise operational and tactical control from *Ohio*. Brig. Gen. Simeon G. Trombitas, Commander, Special Operations Command Korea (COMSOCKOR), along with his battle staff, embarked aboard *Ohio* for over a week. His experienced staff of Army, Navy, Air Force, Marine Corps, and ROK Liaison Officers (LNOs) exercised both joint and coalition missions during KR/FE 08. In addition to *Ohio*'s regular crew complement, over 100 additional riders showcased the SSGN's ability to support an embarked CJSOTF battle staff, Naval Special Warfare Task Group battle staff, a Navy SEAL Delivery Vehicle Team Detachment, and an Army Special Forces Operational Detachment Alpha (ODA) team. By all accounts, the exercise was a resounding success.

Numerous issues regarding the integration of submarine operations with SOF operations came to light during the course of the KR/FE 08. Capt. Gardner Howe, Commodore, Naval Special Warfare Group THREE (NSWG-3) commented from a SOF Global War on Terrorism (GWOT) perspective that, "...I want all the antennas up and communicating unless I have to go down. Historically, the previous operating mind-set would be everything down unless I have to go up." *Ohio*'s commanding officer, Capt. Andy Hale, reiterated the stealth versus communications paradigm stating, "I've had to

Photo by Petty Officer 2nd Class Barry Hiramaya

"I believe we can operate in this environment because I successfully operated with less bandwidth as a Special Forces team leader... during the 1980s."

retrain my officers to be more sensitive to communication (connectivity) than they would normally." KR/FE 08 provided *Ohio* and SOCKOR the opportunity to allow these differing philosophies to work together and ensure "open pipes" in support of SOF and information operations while maintaining 24/7 tactical stealth.

Brig. Gen. Trombitas' past experience with working in restricted bandwidth situations helped put the operating environment into perspective. "I believe we can operate in this environment because I successfully operated with less bandwidth as a Special Forces team leader in Central America during the 1980s. We will certainly have less bandwidth than we do at our land-based headquarters, but we must look at our procedures to determine exactly what information we need to be successful."

The ability of Brig. Gen. Trombitas and his battle staff to communicate continuously with higher headquarters, coalition nodes, and SOF units was exceptional and specifically noted as effective at the higher Combined Unconventional Warfare Task Force (CUWTF) headquarters. The few communications outages that did occur were, on average, only three minutes in duration. SOF C2 was tactically effective and bandwidth availability was not an issue based on over 7,000 staff emails, and even more collaborative chat conversations in support of SOF missions, teleconferences, and daily VTCs.

A new chapter in the submarine force/SOF history was written during KR/FE 08. While coordination between the submarine and SOF communities has been ongoing for over 60 years, a deployed SSGN now enables this relationship to grow substantially. Brig. Gen. Trombitas stated it well when he said "...this must be the first step in a larger evolution; we can't view this as a complete test in and of itself. Board the platform with an open mind and look for what you can do, not what you can't do."

Mr. Cronin is a senior analyst with Scientific Research Corporation.

(Opposite) Combined Joint Special Operations Task Force leadership participate in a video conference.

(Above) Special Operations Forces (SOF) personnel prepare for a mission topside aboard *Ohio*.

by Capt. Jim Stevens

The HOW and WHY of OPEN ARCHITECTURE


U.S. Navy photo

Sailors aboard a U.S. submarine.

Few things have brought more credit and admiration to the submarine force than our success in adapting the open architecture design philosophy and business model for our sonar and combat systems. It has attracted the attention of the rest of the Navy, the acquisition community at large, and Congress. This article is focused on the crux of the program, how and why open architecture works, and the hurdles we have faced, and are now facing, in this evolutionary program.

Introduction: The Processing Crisis

In the 1980s-90s, the front-line sonar system of the Submarine Force was the BQQ-5, its processing power in the Sperry/UNIVAC UYK-7 processor. The UYK-7 was the standard shipboard computer, designed in accordance with stringent military specifications for performance and ruggedness for use throughout the Navy. Configuration control was the primary goal, and we weapons officers and sonar men were proud of the racks of UYK-7's in our sonar equipment space. Yet, these UYK-7s rapidly approached obsolescence. Indeed they were obsolete by the time we got them in the fleet, and we realized it at the time as we were updating our home computers from Intel 80386 processors to 486 processors.

The software we ran on the BQQ-5 was proprietary to the contractor, with only minor corrective fixes possible until the next major sonar system update. This "closed architecture/closed business model" system, with software tied to the hardware, was the business model then, and still is today in many defense systems.

In Washington, D.C., those responsible for modernizing our submarine force faced a monumental task in keeping our BQQ-5 sonar system and its SSBN equivalent BQQ-6 system, modern and up to the threat, which was becoming quieter and quieter, and likewise, with the knowledge that whatever system was fielded it would also be obsolete by the time the fleet was able to use it. The system would be obsolete not only in performance, but in the repair and maintenance of the systems as well. Can you imagine today trying to get a replacement 386 processor? How about trying to run HALO 3 on it? The costs were tremendous, such that even the U.S. Submarine Force—the largest and best-funded in the world—could not afford it.

Pragmatism combined with vision yielded the submarine force launching of the Acoustic Rapid COTS Insertion program (ARCI). One could rightfully state that the C stands for "Capability," but COTS (commercial off-the-shelf technology) really is the key to its success.

Commercial Processors: Price vs. Performance

As anyone who has looked into replacing their home computer will attest, there is always a debate on which processor to base one's new computer. The first question is, "Should you go with the absolute latest processor and pay more, or buy last year's processor—which is good enough for today's software—at half the cost?" The question really is one of do you want "state-of-the-art" or "state-of-the -practice" technology? If we time our purchase correctly, we can purchase the processing power for the applications we need today, knowing that in two years, we are going to buy even newer processors for applications that software developers are currently developing. More importantly, in two years, these processors will become obsolete, and their cost and availability will sky rocket, thus perpetuating computer/software developers' business model.

Open Architecture: Software Independent of the Hardware

The old way of doing business was expensive. It guaranteed recurring revenue to manufacturers for the purchase of sonar and combat control systems. Any significant upgrade in capability resulted in a large sale for them since everything from the sensors, the beam forming hardware, the computers,

the detection and tracking software, and even the cabling were in need of replacement in order to use new system's capabilities. Previously on the order of $150 million per ship set we have achieved a near ten-fold reduction for current cost of about $15 million for today's shipsets.

In an open architecture/open business model system, the software is developed independently from the hardware (through the use of middleware), allowing us to choose the best software application from any company interested in doing business with us. Costs lie in changing lines of code. By continuously updating the small number of lines of code in the middleware, updates to large amounts of hardware-based code and application code are avoided.

The Changing World: Pacing the Threat

Detecting increasingly quiet Soviet nuclear submarines in open ocean areas was the major issue facing the U.S. Navy during ARCI introduction in the 1990s. Subsequently, the Navy changed its emphasis to littoral operations characterized by high surface traffic, a proliferation of increasingly quiet third world diesel submarines (SSK's), and the prospect of mined waters. The U.S. SSN's unique ability to initiate and sustain covert operations in forward areas while detecting and engaging advanced threats is a critical enabler for these Navy littoral operations. A major challenge for Navy planners has been to build into the ARCI business model the flexibility to adapt and respond quickly with capabilities to respond to new needs. Typical of these new needs is the capability to detect a quiet SSK while sustaining operations in high surface traffic and conducting counter-mine warfare.

The Open Architecture Business Model: APBs and TIs

The ARCI business model is a two-year continual process of identifying and prioritizing fleet operational needs, or requirements, developing the software application to address those requirements, and assessing the processors available in the near future.

Fleet-driven Requirements Generation

The Submarine Tactical Requirements Group (STRG) is charged with identifying and consolidating fleet tactical needs and prioritizing them for the software developers. It is led by the Submarine Development Group-TWELVE (DEVRON-12) Commodore, and its recommended requirements are endorsed by Commander Submarine Force, U.S. Pacific Fleet (SUBPAC) and Commander Submarine Force (SUBFOR) in an annual letter to the Director, Submarine Warfare (OPNAV N87). OPNAV N87, the resources and requirements sponsor, then provides those requirements to the acquisition community in a specific letter. The capability it demands needs to be analyzed using end-to-end methodology, rather than just going after the "issue du jour." The technical community then begins to develop it, and tell us how to attain the capability.

U.S. Navy photo

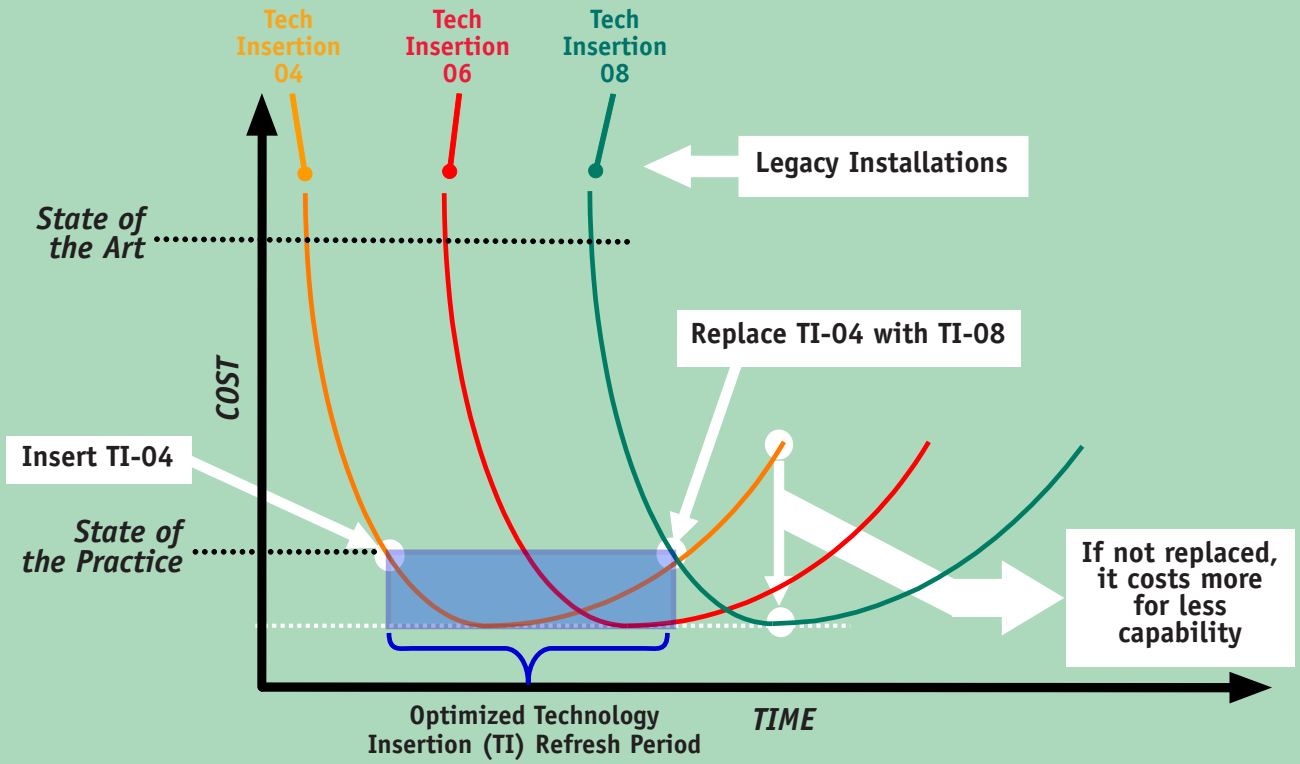
Submarine Command Course students supervise Fire Control Technicians from USS *Columbia* (SSN-771) on the A/N BYG-1 TI-04 APB-04 Trainer at Naval Submarine Training Center, Pacific.

Developing New Capability

Armed with the STRG recommendations and the OPNAV N87 requirements letter, Naval Sea Systems Command (NAVSEA) engineers look at the requirements and solicit proposals from commercial, private contractor, university laboratories, and Navy laboratory software developers to develop solutions. They also look at the processors to be released in the near future that will become available on which to run the software. Two keys to this "open business model" process are peer-review of the algorithm and system level performance and rigorous testing using recorded real-world data culminating in integrated laboratory and sea testing with fleet operators. After each stage of development, software that is developed goes in front of a peer-review panel made up of experts from Navy laboratories, developing contractors, university laboratories and others, which assess whether it meets the requirements (using operational capability-based performance metrics approved by OPNAV N87), will be able to operate on the projected processors, and is reliable. If an application is not deemed by this peer review group to be "ready for prime time," it is sent back to the developer for additional work or for potential deferral to the next software build.

Introducing New Capability

Just as the Program Executive Officer Integrated Warfare Systems (PEO IWS) is responsible for developing the new capability, the sonar and tactical control program offices under the Program Executive Officer for Submarines, the Submarine Acoustics Program (PMS 401), and the Submarine Combat Systems Program (PMS 425), respectively, must make the new software ready for production and deliver it. Software builds are called advance process-



The ARCI business model maintains an optimized Technology Insertion (TI) refresh period to provide a cost-effective method to increase processing capability through the APB processes. Each new TI cycle (18–24 months) typically has double the capability due to Moore's Law.

ing builds (APBs) and hardware is delivered in technology insertions (TIs). Designing and producing TIs is also the responsibility of the program offices. Performance is delivered in the software, and operated on more capable hardware. TIs introduce new hardware as a hedge against obsolescence and to provide additional processing capability, and they incorporate new sensors. They are delivered every even year along with an APB based on the current capability. APBs containing capability improvements are now delivered every odd year. In response to fleet concerns about the burden of tactics, training, and procedural changes associated with the rapid rate of change, we have deliberately slowed down the process so that we are only doing capability-based APBs in the odd years. Even year APBs only support the new TI hardware, and should be transparent to the operators. The delivery model is each submarine will receive a TI with the preceding year's APB approximately every four years, and a new APB before each deployment. After a ship has received a new APB, there will be no more APB/TI upgrades until after the deployment.

Performance Feedback

During development, senior fleet operators participate in testing and provide input on the new software. Additionally, from the beginning, the hardware has embedded data recording capability. This provides the opportunity to see exactly how the system is operating. This recorded data is then used to test subsequent APBs. Another key use is to ensure the current APB builds are not missing any contacts of interest. Raw data from submarine operational missions are analyzed at both the Office of Naval Intelligence (ONI) and Johns Hopkins University's Applied Physics Laboratory (JHU/APL). Armed with hindsight and perfect cueing, and without the pressures of real time operations, acoustic analysts from the development community at large scrub the data, look for the root cause of any missed detection, and propose new processing and display techniques.

"So What?": The Proof is in the Pudding!

This process was developed to allow the U.S. Navy to introduce new capability, while faced with drastically declining budgets. Since it started, there have been nine APBs delivered and that goal has been met. Has performance been improved? Yes! The success of APB has been proven with a towed array Purpose Built Block (PBB). I believe that any submariner would look at the data and be convinced of the utility of our program—and want to get the newest APB for his sub!

Challenges: The Five Hurdles of the Evolutionary Process

The ARCI-APB Open Business/Architecture Model is an evolutionary process which has improved since its inception in 1997. We have five major challenges and have addressed the first three and are working on future challenges. The first hurdle was to separate the hardware and the software, through the use of transportable middleware. The second was to formalize the APB process, keeping it open to third party innovators, ensuring fleet requirements are met and providing a stable funding stream. The third was to avoid obsolescence in hardware with the TI process. With Moore's Law and the submarine deployment and availability cycle as guides, we established new hardware baselines every two years with a goal of hardware replacement on each SSN every four years, i.e. the 2/4 TI Process. In ARCI's evolution, two more hurdles have

been identified.

The fourth hurdle stems from the fact that the ARCI concept was built on the premise of "design once, use many times." The integration process was first designed for two very similar classes, the *Los Angeles*-class and modified *Los Angeles*-class. However, when the SSGN, *Seawolf*, and *Virginia*-class were rolled into APB/TI process, it caused a perturbation to the system, requiring much more engineering development time to match the integrations to the particular class. The solution is straight forward, but will require the integration process to mature. The addition of the combat control system to the ARCI/APB model also caused a perturbation, similarly requiring a fairly straight forward solution. Rather than just considering which hardware/software versions are out in the fleet, we will be establishing a "Fleet Capability Metric" as well, that looks at training, maintenance, and logistic support impact on operational regions and squadrons within a region. This N87/CSF assessment would then identify which hulls should be targeted for the next TI and APBs with the objective of improving fleet end-to-end capability. Merely slowing down the APB/TI process did not address current fleet concerns.

The fifth hurdle is the new and real APB capability must be linked to an Operational Capability Roadmap developed to deliver tactically relevant operational capability. Of all the issues, this requires the most discipline, but if addressed will bear the most fruit. This is where the STRG provides the most impact.

Can you have too much capability?

There is no question that more capability is better, but in 2004–05 it became apparent that the "dB per dollar" curve was approaching its asymptote for current sensors, the TB-16/23/29 and current spheres. At the same time, the increased success in detecting contacts, the broad availability of processing displays, and the great flexibility you now have in the system became a double-edged sword in operating the system. The BQQ-10 can turn any sonarman into a "Jonesy," but only if he's looking at the right display and can interpret the quiet diesel amongst the noisy merchants. So, emphasis and investment turned to building tools to help the operator get his "eyes on the target" across the expanding number of sensors, the improved processing, and the interfering surface contacts. The initial payoff arrives with APB-06, which has the initial introduction of Single Faceplate (SFP) Search, and consolidates all of the processing for a towed array sensor onto a single display surface, cueing from bell ringers, and prioritization algorithms such as the harmonic set tracker which allows drill down to the full resolution ARCI displays for final classification.

The immediate future APB deliveries

For quiet SSK search, the "eyes on target"/Single Faceplate approach from APB-06 is being extended to all sonars beginning with APB-07. Also in APB-07, we are integrating AIS, radar/PATRIOT, periscope, HF active, and sphere PBB contacts onto a command display with capabilities modeled after modern commercial charting/navigation systems, designed for situational awareness and collision avoidance in high surface traffic. In addition, we are eliminating some redundant display surfaces and providing tools for fire control technicians to see previously unavailable sonar solution data such as speed, range rate, and sphere D/E.

Our goals for APB-09 emphasize improving the tools for detecting the quiet SSK (change detectors, prioritization, removal of surface clutter, and reduction in contact multiplication), incorporating WAA ranging as part of maintaining tactical control of the SSK while managing dense surface traffic, developing off-board cueing integration, and incorporating the HF Nav/RLGN systems for improved MCM.

DEVRON-12 is scrubbing the BQQ-10 Operating Guidelines in an effort to provide more focused direction on how to employ the system in various scenarios and against differing contacts. And, for the first time in the history of the APB process, DEVRON-12 recently delivered the new version of the sonar employment manual to the ship before they sailed with their new sonar/combat system (USS *Asheville* (SSN-758) with APB-06).

Every electronic system can lend itself to the open architecture model, but the particular timing of the TIs needs to be carefully selected. We have already applied it to the BYG-1 Combat Control System, and there are seam issues that have arisen with each new APB that needed to be solved with some overarching integration at the overall systems level. We are bringing Integrated Submarine Imaging System (ISIS) and the BLQ-10 system into the model. However, one size does not fit all, other systems may not be optimized with a 2/4 model. For example, TIs of torpedoes and missile systems may be better tied to their maintenance due dates.

Conclusion

ARCI has been a success story at the Department of Defense level for delivering real capability to the war fighters in record time. It is not without its critics, especially those wedded to the classic defense procurement model. However, we could not afford to have done otherwise, either fiscally or operationally. Congress has recognized this: Senate Armed Service Committee Report 110-77 notes that "the Navy's success in building a future force of 313 ships, and with that, the Navy's ability to meet its long-range war fighting requirements, is directly linked to its success in implementing open architecture."

You at the waterfront have an input into the ARCI development process, and your voice is heard. Feed your inputs to your squadron, who will relay it to CSDS-12 or your TYCOM N7 and the Submarine Tactical Requirements Group. We are keenly interested in your input!

Capt. Stevens is the Tactical Systems Integration Branch Head, Submarine Warfare Division (N87).

by Capt. Ken Perry

Managing Modernization

A Fleet First Perspective

Photo by Petty Officer 1st Class James Pinsky

The true measure of advanced processing build's (APB) success is not how much capability we build into a new sonar or combat system, it's how much capability our crews get out of the new systems.

—Capt. Ken Perry
Commodore,
Submarine Development Squadron TWELVE

Commander Submarine Force (SUBFOR) and the Undersea Enterprise are recognized as Navy leaders in harnessing commercial technology and open architecture for improved mission capability. The latest Sonar and Combat Control systems deliver real gains in display quality, faster processing, and better integrated tactical pictures. As Capt. Jim Stevens emphasizes in his article in this edition of UNDERSEA WARFARE Magazine, keeping pace with technology is smart for the warfighter and a smart use of resources.

Keeping pace with technology is an operational imperative: we need the world's most advanced capabilities to deal with the world's biggest set of Submarine Force missions, in the world's most global undersea operations, against arguably history's broadest range of threats. But the true measure of advanced processing build's (APB) success is not how much capability we build into a new sonar or combat system, it's how much capability our crews get out of the new systems.

Keeping pace with technology makes good operational and programmatic sense, but it also poses big challenges for submarine crews who must build and re-build operational proficiency on new systems. To ensure our crews are fully supported in understanding and employing their new systems, partners throughout the Undersea Enterprise must work together to deliver ready equipment, clear documentation, sound employment guidance, and effective training for every tactical system installation. Systems must be adequately tested to ensure they meet performance criteria and are technically compatible with existing ship systems before they are installed on fleet boats. System employment manuals, integrated electronic technical manuals, and other doctrine must be adequate in scope to address new system concepts, tailored for fleet sailors, and delivered in time to support crew training before the new system is scheduled to be employed at sea. Finally, training resources—including time—must be fully ready to support new systems so that the crew can train effectively.

Submariners lead the fleet in understanding and employing advanced technologies. Every commanding officer (CO) returning from a successful mission credits a measure of his crew's effectiveness to the enhanced capabilities made possible by well designed new gear. But the fleet has also voiced concerns about the APB process. Reliability of new processors; interface issues between new tactical equipment and existing ship systems; unclear or incomplete employment guidance or technical documentation; and lack of training support for newly installed gear are some of the gaps that keep crews from realizing the full capabilities of new hardware or a new program build. For some tactical system modernizations in recent years, the ship and crew have paid a big part of the "bill" to make the new installs work the way they were designed.

Keeping Doctrine on Pace with Technology: System

(Above) Contact management displays on USS *Virginia* (SSN-774)


U.S. Navy photo

USS *Nevada* (SSBN-733)(G) navigator Lt. Andrew Ring evaluates the contact picture on AIS.

Employment Manuals (SEM) and Interactive Electronic Tech Manuals (IETM)

As we deal with the pace of technology, it is tempting to look back at legacy systems as "the good old days." They were not. In the 1980s, few ship drivers were complaining about the pace of modern technology or multiple system configurations. Instead we were frustrated by obsolete technology which limited our ability to deal with expanding missions and changing threats. We do not want to go back to legacy "closed architecture" systems; we want to move the APB process forward to deal with a new set of challenges.

By definition, the APB process results in changes to tactical systems. These changes lead to changes in system employment which, in turn, require updated system employment guidance and updated training. As the recognized Navy leaders in exploiting commercial technology and open architecture, SUBFOR and Undersea Enterprise have focused major resources on developing, testing, and installing new systems. Now, as the APB process matures, we recognize a need for greater collaboration among system developers, installers, doctrine writers, and trainers to prepare the ship and crew for employment of the new systems. In a properly balanced approach, all of the following elements are synchronized for delivery on or before the system is installed on the ship:

1) appropriate documentation to support maintenance, logistics, information assurance, and other compliance requirements;
2) system employment guidance; and
3) training resources to build crew proficiency on the new capabilities.

Technology, documentation, doctrine, and training all must be delivered ready and in time to support system employment and crew readiness. In the case of doctrine, the system employment and technical manuals are evolving to deal with the pace of change and to meet the needs of fleet Sailors. In 2007, Commander, Submarine Force (COMSUBFOR) issued the Submarine Force Doctrine Strategy to make system documentation more coherent for tactical decision makers and system operators. Specifically, the strategy specifies a System Employment Manual (SEM) and a complementary Interactive Electronic Technical Manual (IETM) for new tactical systems.

System Employment Manual (SEM): Geared to inform the CO and his watch team leaders in the use of tactical systems. A ready reference for CO/officer of the deck (OOD) in representative operating conditions and tactical situations. The SEM is written by Submarine Development Squadron TWELVE (DEVRON-12).

Interactive Electronic Technical Manual (IETM): The IETM provides detailed information and procedures for the system operator. This includes traditional troubleshooting and maintenance guides, functionality descriptions, "navaids" for the graphical user interface (GUI), system operation, and hierarchy of dropdown menus. IETMs are the responsibility of the system developer.

DEVRON-12 has issued SEMs to cover acoustic rapid COTS insertion (ARCI) sonar builds APB-03, 04, 05, and 06 (including APB-03 on the *Virginia*-class), and for the BYG-1 combat system for APB-05 and 06. The program offices have delivered IETMs which meet the desires of the Submarine Force Doctrine Strategy starting with APB-05 for the BYG-1 and APB-06 for the ARCI Sonar.

Building the Future: Fleet Involvement Pays Off

The Submarine Force has driven the content of all APBs. Beginning with the earliest program builds, teams of Acoustic Intelligence Specialists (ACINTS) provided input to develop improved sonar systems. Later, we brought in our Fire Control Master Chiefs to help shape the AN/BYG-1 combat system. Together these teams, now

known as Concept of Operations Support Groups (COSGs) work to build systems with additional features, advanced tools, and improved displays to make operators more effective.

It is important that, in pursuing advanced tactical capabilities, we maintain a fleet-first perspective. The U.S. Submarine Fleet values advanced technology as a force multiplier. But the introduction of even "small" new features and new displays aboard a ship can sometimes add unnecessary overhead to the crew's training load (where IS that ZOOM button now?!). As there is value in keeping pace with technology, there is also value in stabilizing baseline employment principles to help control the training "cost" to the ships. As a result of fleet feedback, we've increased the involvement of officers with shipdriving and command experience in the design decisions and technical performance evaluations for new systems to help us strike a healthy balance between system modernization and stability.

A great example of fleet-Enterprise partnership, to address top tactical priorities, is a first-of-kind fusion display called Integrated Battlespace Awareness Layout (I-BAL). During 2006 and into 2007, as APB-07 was in development, the top SUBFOR priorities included CO Decision Making and Situational Awareness/ Collision Avoidance. In direct pursuit of these priorities, DEVRON 12 developed a display concept that integrates real-time sonar waterfall data with active contact solutions to provide CO and OOD with a more intuitive, actionable tactical picture. System developers transformed the concept from a white-board drawing to a working prototype and the result is I-BAL ("eye-ball"), a 360-degree PPI-type display specifically designed for the shipdriver. I-BAL fuses real sensor data (the kind every submarine driver demands) with active contact solutions (AIS, radar, periscope observations, high confidence sonar targets). I-BAL doesn't display more data, it displays key data in a more intutitve, coherent, and actionable way. Beta tests with OODs, COs, and tactical teams from both Lant and Pac have provided valuable and positive feedback and DEVRON is shooting for installation—with employment guidance and training—in 2008!

Fleet-first Perspective: the Key to a Solid Return

The Submarine Force has established itself as the Navy leader in modernizing tactical capabilities within a sound business model. As with all complex processes, there is room for improvement. From the fleet's perspective, the operational return on the TI/APB investment will be realized when the new installs are fully compatible with existing ship systems; documentation supports maintenance, logistics, and compliance requirements; employment guidance clearly informs tactical decision makers and system operators; and training resources enable crew readiness—all when the new system is installed. SUBFOR and Undersea Enterprise leaders are committed to the success of modernization, and keeping a fleet-first perspective throughout the modernization process which will improve our "return" at sea, where it matters most.

Capt. Ken Perry is the commodore of Submarine Development Squadron TWELVE.

With the increased use of advanced technology, the training at King's Bay's Trident Submarine Training Facility has become more valuable.

U.S. Navy photo

Q&A Question and Answer

by Lt. Cmdr. Brett Levander

Sailors observe Master Chief Smith demonstrate how to use the trainers at NSTCP.

How Open Architecture Trainers Have Changed a Boat's Inter-deployment Life with Command Master Chief Kurt Smith

Command Master Chief Petty Officer (CMDCM) Kurt Smith has served on USS *Sam Houston* (SSN-609), USS *Tunny* (SSN-682), USS *Cheyenne* (SSN-773), and USS *Columbia* (SSN-771). In addition, his shore tours have included duty as the Submarine Squadron ONE (CSS-1) Staff Fire Controlman; Commander, Submarine Pacific Fleet (COMBSUPAC) Tactical Readiness Evaluation (TRE) Team Fire Controlman; and his current assignment as the Command Master Chief (CMC) of Naval Submarine Training Center Pacific (NSTCP). Master Chief Smith sat down with UNDERSEA WARFARE Magazine to share his thoughts and extensive experiences.

Which fire control systems have you worked on during your career?

I learned my trade on a system that doesn't exist anymore! I attended C-school in San Diego, Calif., in 1985 where I was taught the operations and maintenance of the MK 101 Torpedo Fire Control System. That system was used on USS *Nautilus* (SSN-571) and is now exhibited in several Submarine Museums.

During my sea tours, I have seen everything from the MK 112 Analog Fire Control System on *Sam Houston*, my first boat, to the AN/BYG-1 TI-02 APB-02 on *Columbia* during my chief of the boat (COB) tour. Additionally, my shore tours on the CSS-1 Staff and the COMSUBPAC TRE team enabled me to witness operations on almost every boat in the Pacific. My current assignment as CMC of NSTCP affords me the opportunity to have some hands-on involvement with the latest state-of-the-art ARCI and BYG-1 systems as well as providing guidance and leadership to some of our most talented sailors.

How has growing up in the digital age changed today's young Sailors?

As a COB, it was a whole new world of digital recreation during off-watch hours: iPods in the chow line, DVD players in racks, and computers for playing games in the crew's mess. It was very different from the way we spent our off-watch hours when I was a young Sailor.

Additionally, the technical savvy of today's recruits is quite impressive. C-school is just not required to instill the technical foundation in these Sailors; it is almost innate in their growing up in a digital environment. As the chief fire control technician (FTC) on *Cheyenne*, the high cost and limited availability of personal computers allowed the Navy to feature unique opportunities to work on systems that pushed Sailors beyond their technical know-how. Today, the Navy faces a lot more competition in this arena. Nearly every Sailor has an iPod or DVD player in their bunk, and most are very computer savvy and can almost program the computers. The fire control technicians (FT), electronics technicians (ET), and sonar technicians (ST) that I had were, as a group, eager to learn the Unix and Linux Operating systems and on most occasions could have the Submarine Fleet Mission Planning Library (SFMPL) system up and running by simply editing some Unix commands. This kind of stuff is just not in the technical manuals. I have even witnessed young Sailors going to a bookstore and spending their cash on a Unix Programming book to enhance their in-rate knowledge and understanding.

Master Chief Smith gives one-on-one lessons on the trainer.

How has the fire control technician business changed?

The BYG-1 operating environment very closely resembles the operating systems our Sailors use on their own personal computers. In the days of "green screens," I had to attend a month long course in UYK-7 Diagnostics in order to learn to troubleshoot the computer systems and program in machine language. In today's Navy, the FT's are able to figure out many of the BYG-1 functions intuitively; which can present some not so intuitive challenges.

On the positive, it takes almost no time for a young seaman to sit down in front of the console and be comfortable operating the system. Additionally, when that sailor reaches the end of their comfort zone with a display or function he is using, he can usually intuitively figure out the next step and move on. Finally, "maintenance" is mostly a thing of the past and most of the effort is akin to the work performed on your own personal computer.

On the negative, an FT can gain a false sense of confidence while operating the system if he does not have the theoretical knowledge required to understand the contact analysis functions used. With the operator aids inherent in these new systems, it could be possible for an FT to develop a perfect solution while at the same time not be able to explain the physics behind it. We are trying to overcome this negative by developing an electronic plots course to help teach the basic theory behind and capabilities inherent in the new whiz-bang fire control systems.

Additionally, transferring technical manuals from books to Integrated Electronic Technical Manuals residing on the system helps encourage the operators to execute a self-study program to improve their understanding of both theory and procedures.

Can you tell us about how modern trainers have changed the inter-deployment training cycle?

Here, at NSTPC, we have Legacy, Submarine Multi-Mission Team Trainer (SMMTT) TI-02, SMMTT TI-04, Common Operational Analysis and Employment Trainer (COAET) and, in the near future, we will have a SMMTT TI-06/TI-08 trainer. Our command organization allows us to satisfy the individual boat's training objectives with the trainers without requiring an overwhelming time investment in the preparation of scenarios and metrics from the command's leadership. We have standard scenarios, at various difficulty levels, with standard evaluation metrics, that allow us to provide feedback to commands that tell them exactly where

their skills stand compared to the requirements. We have taken data from years of submarine deployments and attempted to create training scenarios that are identical to situations the watch team will face on deployment. Additionally, we are able to simulate the bathymetry and sound propagation wherever in the world we choose to run the scenario.

As a result, squadrons are now able to evaluate watch team performance in as close to a real situation that they will face on deployment without crossing the dateline, thereby revolutionizing the deployment certification process. Now, prior to putting to sea in the locals for a final evaluation on complex functions such as command and control, decision making, and risk management, the squadron can already have certified the watch teams to possess the requisite basic skills in contact management, contact identification and tracking, and weapons employment to succeed at sea.

Alternatively, when a boat finishes their deployment stand-down and inevitable large crew turnover, the trainers become an invaluable tool for introducing new crewmembers to their at-sea watch station, polishing the basic skills that may have degraded post-deployment, and develop watch team fundamentals. These basic building blocks are accomplished prior to the boat going to sea, and makes underway time more productive by allowing focus above the basic level skills right away.

Recently, the Submarine Force has taken this concept a step further. Some skills required to be demonstrated during TREs are difficult to simulate in the local submarine operating areas. The densities of surface contacts found in some places in the world are not seen here off of Pearl Harbor. So, a portion of this command evaluation is sometimes performed and graded at NTSCP.

Finally, our facility also allows boats a maintenance environment to sustain and improve their skill level. Junior members of specific training groups are able to work on fundamental skills without inspection-like evaluation, and individuals or watch teams, who are struggling in a particular mission area, have the opportunity to improve.

NSTCP supports the submarines of Squadrons 1, 3, and 7 in Pearl Harbor, submarine command courses, sailor qualifications, and a myriad of other courses and training opportunities

Lt. Cmdr. Levander serves as the military editor of UNDERSEA WAFARE Magazine, in addition to being the congressional liaison for the Director, Submarine Warfare (N87).

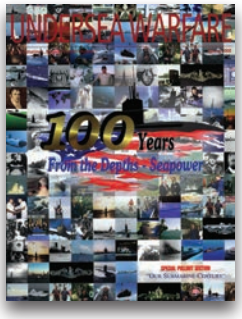
Master Chief Smith instructs one Sailor on the trainer while the group looks on.

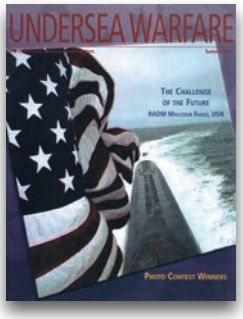
U.S. Navy photo

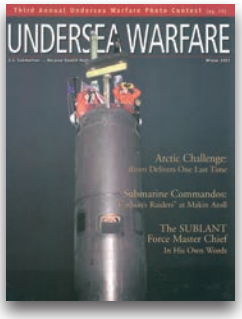
UNDERSEA WARFARE

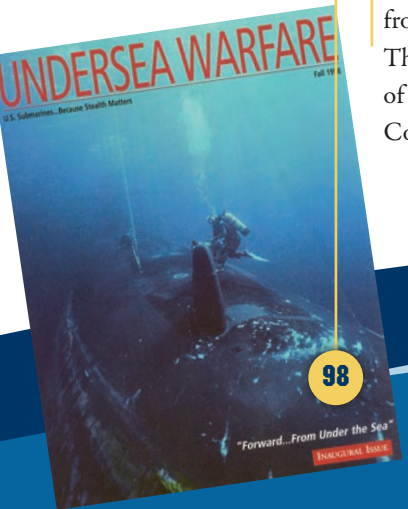
Celebrating 10 Years as the Voice of the Submarine Force

UNDERSEA WARFARE Magazine is pleased to be celebrating its 10th anniversary as the voice of the United States Submarine Force. The Submarine Force has reached many milestones over the past ten years, most of which have proudly been covered in this magazine. From exercises to commissionings, keel layings to deployments, launchings to homecomings, UNDERSEA WARFARE Magazine has been there. As we look back on the successes of the past ten years, UNDERSEA WARFARE Magazine would like to thank you all for your continuous support, enabling us to present these milestones to you.









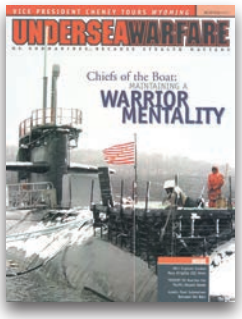
98 Inaugural issue *(left)*—Voices from the Deep: The New Age of Submarine Communications

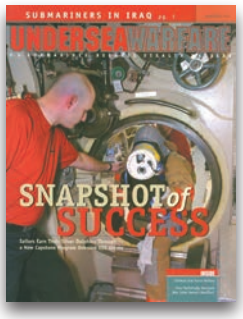
99 Focus on SSBN and planning of *Virginia*-class

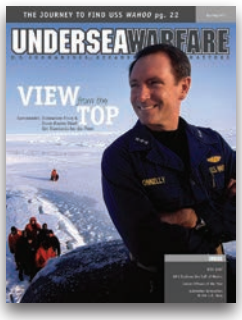
00 U.S. Navy celebrates 100th anniversary of the Submarine Force

01 Start of SSGN conversion

02 Submarines in the war zone







SURVIVEX 2003—First escape exercise from a disabled submarie

Submariners in Iraq

USS *Jimmy Carter* (SSN-23) joins the Fleet

USS *Ohio* (SSGN-726) returns to service

Focus on USS *Virginia* (SSN-774)

Advanced Special Operations Forces missions from sub-marines

03 04 05 06 07 08

by Molly Little

Question and Answer

Sailors "man the ship" and officially bring the newest *Virginia*-class nuclear attack submarine USS *North Carolina* (SSN-777) to life during her commissioning ceremony.

The Push to Keep the Best and Brightest in the Submarine Force

Lt. Cmdr. Eric Mason is the Submarine Force Diversity Officer. He took some time to share some insight into his unique new position in the Force.

As the diversity officer, how do you use the diversity statement in your daily tasks?

When I was working on the diversity policy, I was really working on my job description. Coming into a new job, there are a lot of "firsts" and a lot of new ideas tossed around. As long as everything contributes to the core idea of attracting, training and retaining the best our nation has to offer, I know I am doing my job.

Was there a previous diversity statement? If so, what is different about this one?

No, there was no previous statement. The Undersea Enterprise Diversity Office was established in August, 2007. Since its foundation, the first Submarine Force diversity policy statement was released. I know it may seem redundant for there to be so many trickle-down statements out there, but it really gives us an opportunity to demonstrate that we understand what diversity means to the Submarine Force and the Navy, as a whole.

What initiatives were in place before the current diversity statement was released?

Prior to releasing the policy statement and establishing the Diversity Office, diversity efforts were performed by the Equal Opportunity office. They were responsible for updating the Force on upcoming affinity group conferences and eligible citizenship and engineering awards. Equal Opportunity was more about compliance—the Diversity Office is about supporting an active cultural shift.

What new initiatives have been implemented since Vice Adm. Donnelly released this statement?

The military has known for a long time that great officers are not self-made; they are the product of all the interactions and mentorship they accrue in their careers. While it is difficult to force someone to mentor or be mentored, our efforts are geared towards providing the opportunities and culture that are supportive.

The Submarine Force (SUBFOR), Navy Recruiting Command (NRC), and Naval Service Training Command (NSTC) have recently combined their efforts to attract qualified individuals from all walks of life into the Submarine Force. Submarine Commanding Officers coordinate their trips with local Naval Recruiting Districts to visit Naval Reserve Officers Training Corps (NROTC) units across the country. The desired effect is an increase in awareness of the Nuclear Propulsion Officer Candidate (NUPOC) program with local university faculty and staff and affinity groups {National Society of Black Engineers (NSBE), Society of Hispanic Professional Engineers (SHPE), etc}. Since the nodal visit concept was introduced we've visited schools throughout Georgia, California, Florida, Virginia, New York, New Jersey, Michigan, New Mexico, and North Carolina.

Two outstanding affinity organizations are holding their annual conferences in Hampton Roads. The Association of Naval Services Officers (ANSO) and the National Naval Officers Association (NNOA), both sharing the missions of fostering the professional growth and development of Sea Services personnel through mentoring, networking, training, and educational programs, held annual conferences during the weeks of April 28, 2008 and July 23 – 25, 2008 respectively. The Submarine Force sent Submarine Officers and Sailors to both.

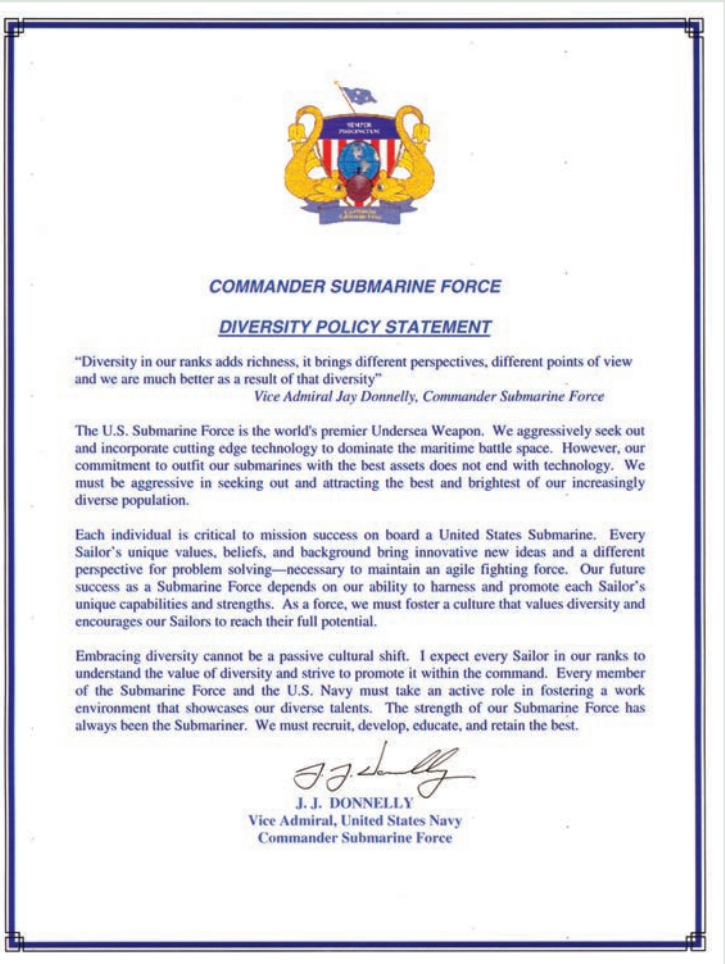
Another initiative was the development of a mentoring Web site aimed at increasing the development, education, and retention of our junior officers. The Web site allows mentors not located in one central area to evaluate their protégés remotely. This tool enables leadership to ensure no one slips through the cracks or gets too far off course without a rudder-check.

Does the Diversity Office have goals to meet? If so, what are they and how do the previous mentioned initiatives fit into those goals?

While most people would think there are monthly quotas to meet, there are not. It all goes back to our vision statement. It is hard to have a metric that tracks how well a community embraces diversity. The goal—attract, train, and retain the best our nation has to offer—provides robust and focused marching orders for the long term. We are not waiting to declare "mission accomplished," when we have accessed a certain number of minority officers. Rather, twenty years from now when we are still the world's most powerful Navy and the premier Submarine Force, I will know I've done my job.

The changing demographics of the American population and the diversity of our missions in the world demand Navy take proactive steps to ensure it has access to the full range of the nation's talent. Leveraging the strength of the nation's diversity creates an environment of excellence and continuous improvement, in which artificial barriers to achievement are removed and the contributions of all participants are valued.

—Adm. Michael Mullen
Chairman, Joint Chiefs of Staff



COMMANDER SUBMARINE FORCE

DIVERSITY POLICY STATEMENT

"Diversity in our ranks adds richness, it brings different perspectives, different points of view and we are much better as a result of that diversity"
Vice Admiral Jay Donnelly, Commander Submarine Force

The U.S. Submarine Force is the world's premier Undersea Weapon. We aggressively seek out and incorporate cutting edge technology to dominate the maritime battle space. However, our commitment to outfit our submarines with the best assets does not end with technology. We must be aggressive in seeking out and attracting the best and brightest of our increasingly diverse population.

Each individual is critical to mission success on board a United States Submarine. Every Sailor's unique values, beliefs, and background bring innovative new ideas and a different perspective for problem solving—necessary to maintain an agile fighting force. Our future success as a Submarine Force depends on our ability to harness and promote each Sailor's unique capabilities and strengths. As a force, we must foster a culture that values diversity and encourages our Sailors to reach their full potential.

Embracing diversity cannot be a passive cultural shift. I expect every Sailor in our ranks to understand the value of diversity and strive to promote it within the command. Every member of the Submarine Force and the U.S. Navy must take an active role in fostering a work environment that showcases our diverse talents. The strength of our Submarine Force has always been the Submariner. We must recruit, develop, educate, and retain the best.

J. J. DONNELLY
Vice Admiral, United States Navy
Commander Submarine Force

Ms. Little is the managing editor of UNDERSEA WARFARE Magazine.

by Molly Little

Junior Officers of the Year


Photo by Molly Little

The Submarine Force Ho

You are immediately placed in a position where you are given the chance to make a positive impact both on the Navy and on the global community, a chance to defend the country. Take advantage of that opportunity, and make sure the lives of the sailors around you and in the boat are improved by your presence.

—Lt. Nicholas E. Saflund, USS Cheyenne *(SSN-773)*

Every year submarine squadrons select the best and brightest from their wardrooms to be Junior Officers of the Year (JOOY). The process begins with the commanding officers of each boat and submarine tender nominating one of their junior officers. These nominations are then submitted to the squadron and each squadron picks one junior officer that best demonstrates superior seamanship, management, leadership, tactical and technical knowledge to be their representative.

The 2008 JOOYs are: Lt. Nicholas Bogaard, USS *North Carolina* (SSN-777); Lt. William F. Cunningham, USS *Alaska* (SSBN-732); Lt. Michael Eliason, USS *Los Angeles* (SSN-688); Lt. David Hart, USS *Minneapolis-St. Paul* (SSN-708); Lt. Adam Zaker, USS *City of Corpus Christi* (SSN-705); Lt. Luke Swartz, USS *Ohio* (SSGN-726) (G); Lt. j.g. Jeremy Parm, USS *Springfield* (SSN-761); Lt. j.g. Michael Mazzone, USS *Virginia* (SSN-774); Lt. j.g. Cory Schneberger, USS *Scranton* (SSN-756); Lt. j.g. Ryan Hackman, USS *Oklahoma City* (SSN-723); Lt. j.g. Kevin Moeller, USS *Annapolis* (SSN-760); Lt. j.g. Jeremy Medlin, USS *Florida* (SSGN-728)(B); Lt. j.g. John R. Nakel, USS *Seawolf* (SSN-21); Lt. j.g. Nicholas E. Saflund, USS *Cheyenne* (SSN-773); Lt. j.g. Russell Jones, USS *Topeka* (SSN-754); Lt. j.g. Jesse Birbach, USS *Kentucky* (SSBN-737) (B); Lt. j.g. Travis Wagner, USS *Emory S. Land* (AS-39); Lt. j.g. Charles E. Barreras, USS *Frank Cable* (AS-40).

In honor of the significant achievements of each JOOY, a recognition program honored their contributions to the Submarine Force during a four day stay in Washington, D.C. for each JOOY and their spouse. While visiting the nation's capital, the junior officers (JO) had the opportunity to talk with some of the top leaders of the Navy, including: Adm. Gary Roughead, Chief of Naval Operations; Adm. Kirkland Donald, Director, Naval Reactors; Adm. Patrick Walsh, Vice Chief of Naval Operations; Rear Adm. Bruce Grooms, Director, Submarine Warfare; Rear Adm. Patrick Brady, Deputy Director, Submarine Warfare; and Rear Adm. Tom Eccles, Deputy Commander for Undersea Warfare (NAVSEA 07).

The JOOYs and their spouses also had opportunities to tour the Office of Naval Research, the Capitol, the Navy Memorial, the Naval Observatory, the White House, the Navy Museum, the Smithsonian Museums, and the Pentagon.

The experiences of the JOOYs and their spouses while in Washington, D.C., are chronicled through the photographs of their visit and insights they shared with UNDERSEA WARFARE.

Ms. Little is the managing editor of UNDERSEA WARFARE Magazine.


Photo by Molly Little

Always have a positive attitude—it is going to make what you are doing not so bad and as an officer, your attitude is mirrored in the guys that work for you.

Lt. j.g. Jeremy Parm, USS Springfield *(SSN-761)*

Knowledge is power. Knowing what you are supposed to do and having the confidence to do it is a characteristic of true leadership.

Lt. j.g. Jeremy Medlin, USS Florida *(SSGN-728)(Blue)*

onors its Top Junior Officers


Photo by Molly Little

I think the best thing about being a submarine JO is the amount of back up and support you get, whether it be from your watch team, your division or your wardroom.

—Lt. Nicholas Bogaard, USS North Carolina *(SSN-777)*

There are great lessons to be learned from your chiefs and first class petty officers, as well as senior leadership at your command.

—Lt. j.g. Travis Wagner, USS Emory S. Land *(AS-39)*

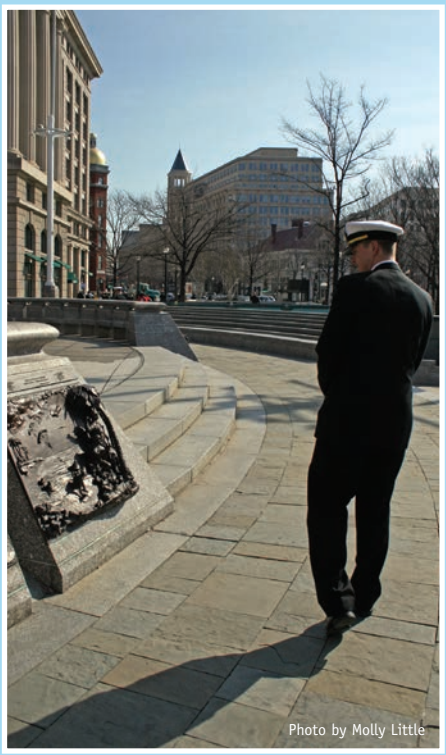


Photo by Molly Little

(Opposite) The Junior Officers of the Year at the Navy Memorial.

(This page, clockwise) Lt. Mitch Eliason, Lt. David Hart, and Lt. j.g. Michael Mazzone at the Navy Memorial.

The JOOYs with their wives and Adm. Gary Roughead, Chief of Naval Operations.

Lt. j.g. Cory Schneberger walks along the wall at the Navy Memorial.

by Daniel T. Rean

Submarine Special Operations in World War II

The submarine's ability to penetrate a hostile area independently, covertly and for long durations, provided a unique tactical advantage during World War II. Submarines operating undetected near the enemy's coastline provided a complete picture of the undersea, surface, and near shore military conditions, including enemy force dispositions and preparations. The submarine, with its extremely capable communications ability, operating well inside the enemy's defensive barriers, provided valuable tactical information to assist Army and Marine Corps field commanders in making timely, informed decisions. In that role, submarines paved the way for the effective employment of special covert forces and insulated those same forces from unnecessary risks during the initial phases of guerrilla warfare operations.[1]

Pacific Theater Commander, U.S. Army Gen. Douglas MacArthur

The east side of Pearl Harbor with the submarine base at center.

Vice Adm. Charles A. Lockwood aboard a U.S. submarine, May 1945.

Between January 1942 and August 1945, dozens of American submarines participated in special operations ranging from destroying enemy mines to serving as lighthouse beacons to guide Allied ships through uncharted hostile waters. Oftentimes, those special operations were documented by single-line entries in ships' logs, or mentioned in passing in the official reports of the supported units. Those special operations could not have been performed by any other naval assets, military organizations, or land-based forces at the time, yet their documentation is incomplete and relatively unknown outside military fraternities. The historiography of the special operations of World War II submarines is documented in countless publications scattered throughout museums, military archives, and libraries, but no single comprehensive record exists to adequately provide authoritative information on the numerous support missions in which members of America's "Silent Service" participated on a routine basis.

In World War II, the submarine's ability to circumvent traditional defenses was exploited to the fullest to deliver supplies to American-led guerrilla forces, to rescue pilots (both Allied and enemy) who had been shot down over the ocean, to land and extract coast watchers on remote Pacific islands, to evacuate escaped prisoners of war, to lay mines, and to conduct reconnaissance of potential invasion sites for future Allied actions. They were uniquely designed for the role of hunter in hit-and-run attacks in attrition warfare, and were least capable in missions that require prolonged exposure in a sustained defensive posture. The tactics that gave them their greatest fighting potential do not conform to the classical Mahanian[2] naval strategy of defeating the enemy in a battle of annihilation. Although the U.S. Submarine Force made up but two percent of the United States Navy, it accounted for 55 percent of Japanese maritime losses. But, this service paid a high price: out of a total of 16,000 submariners, 375 officers, and 3,131 sailors died at sea, a 22 percent casualty rating, the highest percentage of all U.S. Armed Forces.[3]

> The Japanese commander of the carrier task force that wrought so much damage at Pearl Harbor on Dec. 7, 1941, missed a golden opportunity to knock out the U.S. Navy's most effective warships by limiting his target selection to aircraft carriers and battleships... Fortunately for the United States, the Japanese failed to destroy the submarine base in Hawaii... It was the submarine force that carried the load until the great industrial activity of America produced the weapons needed to prosecute the war against the Japanese.

Modern historians who study the great sea battles of World War II most often focus on the obvious aspects of modern naval warfare by examining the contributions made by aircraft carriers and carrier task forces at battles like Midway, Coral Sea, and the Marianas "Turkey Shoot." To be sure, great sea battles severely crippled the enemy's ability to wage war and provided an incalculable boost to Allied morale. But despite the Mahanian strategic importance of decisive sea battles fought between battleships, heavy cruisers, and their supporting units, the outcomes of these battles had little tactical value to the troops fighting on land. The

continued erosion of a nation's ability to support land-based troops through its merchant fleet showed how lethal commerce raiding could be when wedded to submarine technology.[4] The Japanese commander of the carrier task force that wrought so much damage at Pearl Harbor on Dec. 7, 1941, missed a golden opportunity to knock out the U.S. Navy's most effective warships by limiting his target selection to aircraft carriers and battleships. The ships that were sunk or severely damaged in the attack at Pearl Harbor could not have operated effectively in the far western Pacific theater for many months even under the best of circumstances, and their loss to the Navy proved only temporary when they were eventually refloated and repaired. The Japanese Naval High Command knew the strategic importance of devastating the dockyards, the above-ground fuel supplies and the airfields, but they underestimated the value of other ships, which were left untouched in the attack.[5]

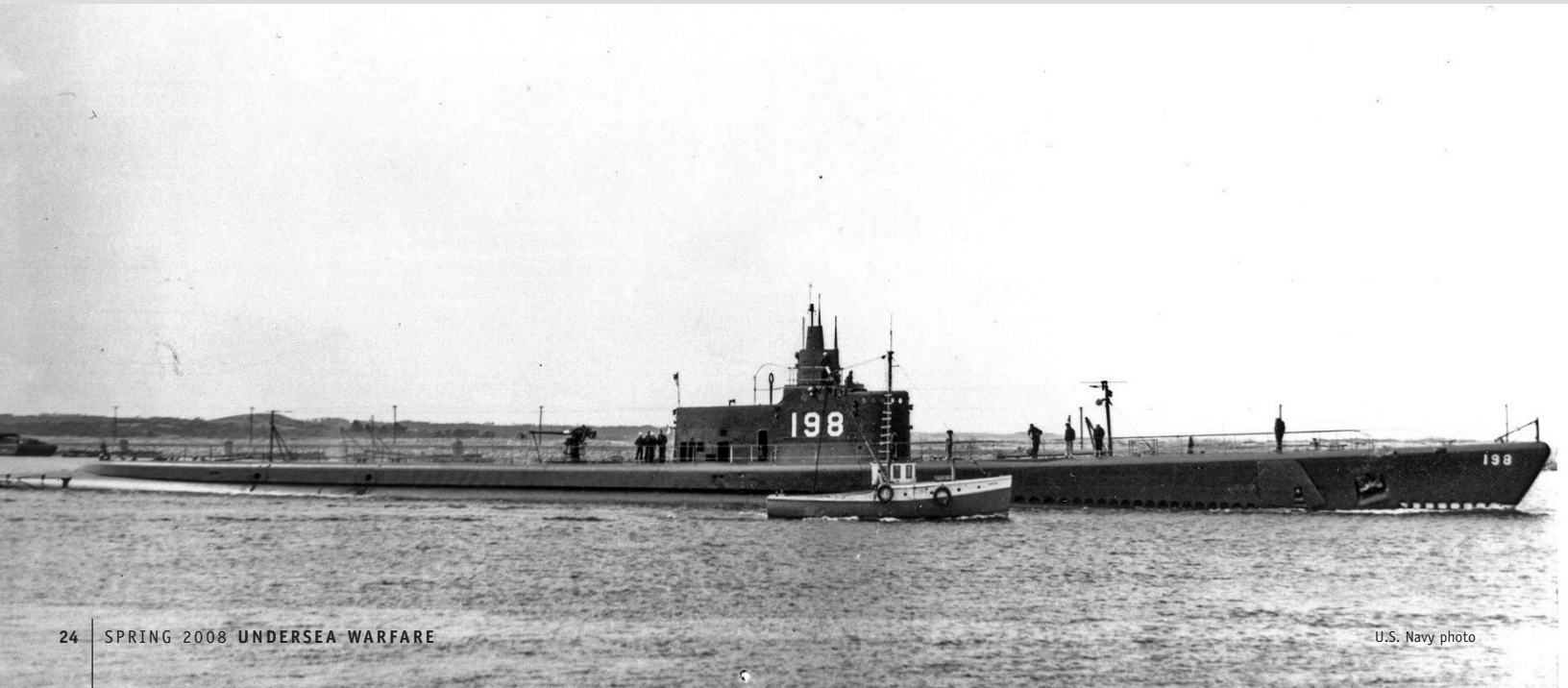
Fortunately for the United States, the Japanese failed to destroy the submarine base in Hawaii, preserving the supplies, facilities, and fuel that were needed and leaving it the only service branch capable of bringing the war to the enemy through immediate offensive actions. It was the submarine force that carried the load until the great industrial activity of America produced the weapons needed to prosecute the war against Japan.[6]

The historiography of World War II submarine warfare is treated almost as a separate conflict that pitted the U.S. Submarine Pacific Fleet against the merchant shipping and naval forces of Japan —a sort of war within a war. American submarines in the Pacific, with but limited help of a few British and Dutch boats, played a major role in the defeat of Japan. They decimated that country's merchant fleet, choked off essential supplies and prevented material support for the Japanese war effort. Most historiographies of submarine warfare have focused on the destruction of enemy shipping by describing every aspect in locating, stalking, determining a firing solution, attacking, and sinking a target. There is also an emphasis on trying to recreate the atmosphere that pervaded all submarine combat action – the talking in whispers and movement in stocking feet to reduce unnecessary noise that might be emitted through the hull, and the everyday life in cramped quarters that became even more suffocating when submariners faced the terror and uncertainty of survival while enemy depth charges relentlessly rattled their boat. What is lacking in the history of submarine combat actions during World War II is a summary of all the special operations that were conducted in between the "find 'em, shoot 'em, sink 'em" aspects of submarine warfare. Although the commerce raiding conducted by submarines was their most obvious contribution to the war effort, the secondary role of the submarine as a "shadow warrior" used in covert operations was equally important, and had far greater influences on the peripheral elements of warfare that contributed to the defeat of the Japanese military.

Despite the historical significance and importance of the specialized warfare roles of the submarine forces during World War II, those missions were viewed by the sailors who carried them out as time taken away from their primary function of conducting unrestricted warfare against the enemy. Fleet-type submarines were designed for one mission—to sink ships—and there was little patience for anything else.[7] Doctrine and tactics combined to limit the effectiveness of American submarine attacks in the early days of World War II.

Following the Japanese attack of Pearl Harbor, the Chief of Naval Operations issued the first U.S. fighting directive with the one-line message, "EXECUTE UNRESTRICTED AIR AND SUBMARINE WARFARE AGAINST JAPAN."[8] Neither by training nor by indoctrination was the U.S. Submarine Force ready to carry out the order to fight an unrestricted war against Japan. Submariners were trained to fight a different kind of war – one that stressed action against enemy warships in between routine scouting missions. Submarine commanders were imbued with the idea that they were to observe ethical tactics based on the rules for sea conflict. Those rules were established by international treaty and imposed many legal limitations on submarines. Chief among the restrictions impressed on the memory of every submarine skipper was the provision that any naval vessel found guilty of any violation of the rules in the treaty could be hunted down and captured or sunk as pirates.[9]

Early in the war, submarine organizational and tactical problems were further exacerbated by the fact that all naval oper-



U.S. Navy photo

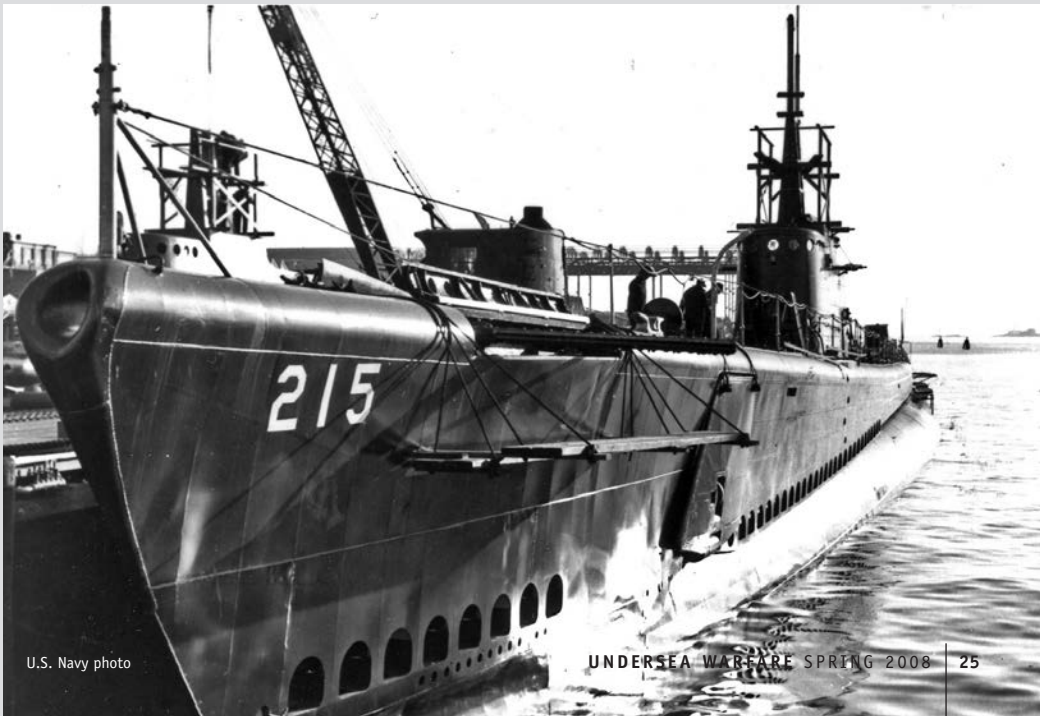
ations fell under the authority of the theater commander, Gen. Douglas MacArthur, who believed submarines were best used in support of guerrilla operations as they had proved during their support missions to Corregidor. Since there were only a handful of poorly led and organized guerrilla operations in the Philippines at that time, submarines spent weeks in port waiting for orders from MacArthur rather than operating in enemy waters and destroying Japanese merchant traffic.

In April 1942, Vice Adm. Charles Lockwood was placed in charge of the Asiatic submarine force and immediately began overhauling the command structure. Lockwood reorganized his submarines into squadrons and put them under his direct command. He determined that poor logistical command decisions in combination with submarine commanders who were too cautious and failed to close with the enemy at a range that would increase the chances for a successful sinking were major problems that needed to be overcome. They also displayed little initiative or killer instinct and insisted on the reliance of by-the-book firing solutions, and when they did attack an enemy ship the torpedoes in use at the time ran ten feet below their selected settings and were plagued with faulty magnetic and contact exploders. As a result, one-third of the submarine skippers were relieved of their commands in the first year of the war.[10]

Of all the changes this new admiral made to improve the combat effectiveness of America's submarines, perhaps the most significant change was putting into place a fixed submarine operational schedule with the specific task of supporting special operations.[11] The principles for special operations were simple: A submarine operating in enemy territory could not be seen, but must still accomplish its mission. If a submarine was going to make contact with the enemy, it had to attack on its own favorable terms. And after the attack, the submarine had to disappear, continuing the illusion that an unknown force had engaged the enemy.[12]

The special missions were never easy as they usually demanded multiple penetrations of enemy territory—which were far more hazardous than normal war patrols.

The first mission executed by Pacific Fleet submarines involved carrying supplies to the defenders of Corregidor. Transportation of intelligence agents to and from enemy-held territory soon followed, but what proved to be the most valuable of those early special operations was the submarine's ability to relay information of enemy ship movements by coast watchers. As part of their everyday duties, and when not under orders to maintain radio silence, submarines reported the weather, tides, available navigation aids, and enemy force structure in their operating area. Special Operations missions were never undertaken without a large degree of risk, but the dangers of those first missions into the unknown were magnified by lack of experience and precedent.



U.S. Navy photo

(Opposite) USS *Tambor* (SS-198), *(Right)* USS *Growler* (SS-215)

As the war raged on, submarines were called upon to undertake all kinds of special missions that were divided into several general types: reconnaissance, supply, evacuation or rescue, transportation of coast watchers and intelligence agents, lifeguarding, mining, weather reporting, support of commando raids, and serving as lighthouse beacons for surface ships.[13] Any submarine assigned to special missions might perform more than one of those tasks.

The first missions executed by Pacific Fleet submarines involved carrying supplies to the defenders of Corregidor. Transportation of intelligence agents to and from enemy-held territory soon followed, but what proved to be the most valuable of those early special operations was the submarine's ability to relay information of enemy ship movements by coast watchers. As part of their everyday duties, and when not under orders to maintain radio silence, submarines reported the weather, tides, available navigation aids, and enemy force structure in their operating areas. Special Operations missions were never undertaken without a large degree of risk, but the dangers of those first missions into the unknown were magnified by lack of experience and precedent.[14]

As the American situation on the island of Corregidor began to look hopeless, more and more high-ranking Filipino government officials had to be evacuated. The Japanese knew that the Americans were getting supplies to the island, and increased their own naval presence around the Philippines in an attempt to form a blockade. U.S. submarines were still able to slip through gaps in the Japanese defenses. In February 1942, USS *Swordfish* (SS-193) snuck into a harbor at Corregidor and brought out the president of the Philippine Commonwealth, Manuel Quezon, and several other members of his government. By the end of the month, the American battle for the Philippines and the Dutch battle for Java were virtually over and the Allies had lost.[15] For all practical purposes, the U.S. Submarine Force was the only element of the Asiatic Fleet that remained to fight the Japanese, but the experience the submarine crews learned while performing special missions paid huge dividends in the guerrilla and resistance operations throughout the South Pacific.

Following the invasion of Manila, USS *Trout* (SS-202) transported the entire Philippine treasury (2 tons of gold bars and 18 tons of silver) from Corregidor to Hawaii in order to prevent it from falling into Japanese hands.

In every radio broadcast he made from Australia to the Japanese-occupied Philippines, Gen. MacArthur had famously insisted, "I shall return," a morale-boosting promise heard by many Filipinos on radio equipment brought to the islands on "guerrilla" submarines. When the tide of the war fully turned in favor of the Americans, and MacArthur was finally able to liberate the Philippines from the Japanese, it was the American Submarine Force that played the key role in making MacArthur's promised return a reality.

Shortly after departing the Philippines in early 1942, Gen. MacArthur began looking for a means of harassing the Japanese in preparation for his promised return. Early attempts to contact and organize the bands of guerrillas operating throughout the Philippine Islands were complicated by the fact that the majority of guerrilla forces were little more than roving bandits with no allegiances to any central authority, and whose raids were uncoordinated and accomplished for personal gain. Within a few months of trying to organize the guerrilla effort, it was clear that providing the needed outside support would prove an extremely difficult task, and there was a woeful lack of leadership among the natives despite their apparent loyalties to America.[16]

The performance of America's submarine force in providing military aid to the troops on Corregidor convinced MacArthur that those same submarines might be able to provide the supplies and equipment necessary to carry out a sustained guerrilla movement. However, two seemingly insurmountable problems had to be resolved before any covert operation began. Contact had to be made with the guerrillas in the Philippines in order to organize and coordinate their actions and MacArthur needed to find a reliable and well-respected leader who could rendezvous with the guerrilla leaders.

The answer to that problem came in the form of Charles "Chick" Parsons, who had escaped from the Japanese in the Philippines a few months earlier.[17] He was also a Lt. Cmdr. in an intelligence unit of the U.S. Naval Reserve who had remained behind in the city to collect intelligence on the Japanese occupiers. Fluent in several of the over 70 native dialects, intimately familiar with the islands, and a good friend of MacArthur from their days together in Manila, Parsons was just the man the general was looking for to act as a liaison with the Filipino guerrillas.

In late February 1943, Parsons was transported to Labangan aboard the submarine USS *Tambor* (SS-198). His first mission was to deliver $10,000 in cash and two tons of ammunition to one of the guerrilla leaders in the region.[18] Parsons also delivered radio equipment for use in setting up his spy network. Weapons, food, clothing, and communications that Parsons delivered on a regular basis were sorely needed by the Filipino guerrillas. This initial clandestine visit to the Philippines lasted until July 1943.

As Allied war planners began to formulate a strategy for the Gilbert Islands campaign, the admiral in charge of air operations contacted Vice Adm. Lockwood and asked him if he could spare any of his submarines to serve lifeguarding duty. Lockwood set up a routine submarine schedule to support the air operations. Submarines were assigned specific stations in the area of air operations and were provided a unique call sign that linked them to that area. Pilots who had

to ditch their planes in the ocean were instructed to send an un-coded radio message with the call sign that corresponded to their assigned area. That call sign alerted the submarine in the area that a pilot was in trouble and sent it on its way to make the recovery. In the event that the identification system was ever compromised, to prevent the Japanese from sending false rescue messages the call signs all featured the liberal use of words that started with the letter "L" —such as "Lonesome Luke," "Little Lulu" and "Lollipop"—all linguistic phrases that tongue-tied the Japanese.[19]

The submarine USS *Finback* (SS-230) rescued future U.S. President George H. W. Bush. Lt. Bush was returning from an attack at Chichi Jima when his plane was shot down by Japanese fire over the Bonin Islands. He and his crew waited in a rubber raft for four hours until the submarine surfaced nearby and rescued them. All totaled, 86 American submarines participated in lifeguard missions and rescued 504 Allied airmen.[20] Although it took them away from their primary mission of sinking Japanese ships, lifeguard duty was the one special operation submariners truly enjoyed. It gave them an immediate sense of accomplishment, allowed them plenty of time for routine training and evolutions, and crews were free to pursue any target of opportunity while on station.

By the summer of 1945, the Submarine Force had run out of targets, and the boats could go almost anywhere they wished to accomplish special missions. In the closing months of the war, submarines equipped with rocket launchers bombarded military and industrial targets in northern Japan.[21] Photographs of enemy positions taken from the periscopes of submarines were unheard of at the start of the war. However, by war's end, that type of information became so valuable that Allied war planners were unwilling to devise definitive operational plans without it.[22] The overall effects of submarine warfare were so obvious that some American planners believed that the economic collapse of Japan made an invasion of the home islands unnecessary.[23]

As the war continued and the submarine's versatility was more widely recognized by all branches of the service, the undersea warriors were called upon to undertake all manner of special missions. The joint operations culminated in a mutual respect between the men in the field and the men on the boats, as well as an increased likelihood of success in every special mission. Because special missions seldom afforded an opportunity to sink enemy shipping, many of those missions were disliked by the men who accomplished them. Although difficult to measure in terms of cold facts or statistical parameters, their value in promoting the ultimate defeat of the enemy was immense.[24]

The 20 submarines that supported the guerrilla operations in the Philippines as part of "MacArthur's Navy," successfully completed 41 missions in which 472 persons were evacuated, 331 persons were delivered, and 1,325 tons of supplies were unloaded.[25] All of the special missions were accomplished in the enemy's backyard at great risk to the safety of the submarine and her crew. Given the strategic circumstances of some of the tasks, the variety of operations that were performed and the hazards involved, it is more appropriate to designate those operations as "extraordinary missions." Most people will never know what the submarine force accomplished in World War II. In the other services, the territory that was captured was represented on maps. No flag was raised over the spot where an enemy ship was sunk indicating the submarine responsible for that sinking.[26] Submarines had to disappear as quickly as they had struck. Stealth and surprise were never more needed than during the accomplishment of special missions. Yet for all of the special missions they accomplished, submarine service in the Pacific was a highly personal experience marked by combat operations against enemy ships. That action was filled with memories of the smells of sweat and oil, the bone-shattering concussion of exploding depth charges, the controlled chaos of an emergency dive, the tension of a submerged attack and the quick peek through the periscope at a flaming tanker, but most of all, there was a deep sense of accomplishment.[27]

The pre-war strategists who saw submarines as secondary naval units limited to torpedo attacks were surprised by what the boats left untouched in the attack on Pearl Harbor were able to accomplish with only four years of combat experience. The employment of submarines in extraordinary special missions, combined with the ingenuity of submarine commanders and their crews, made impossible tasks realities, and proved that through initiative, teamwork, leadership, and ingenuity, America's submarines were the most valuable assets of World War II.

USS *Gudgeon* (SS-211) was a *Tambor/Gar*-class submarine.

Endnotes and bibliography for this article are available in the online version, available at http://www.navy.mil/navydata/cno/n87/usw/issue_37/index.html

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USS *North Carolina* Joins the Fleet

by Lt. Jennifer Zeldis, Fleet Public Affairs Center Atlantic

Photo by Petty Officer 2nd Class Roadell Hickman

Submarine veterans, retired Battleship North Carolina Alumni and some 6,000 attendees witness the commissioning of the newest *Virginia*-class nuclear attack submarine *North Carolina*.

The Navy's newest nuclear-powered submarine, USS *North Carolina* (SSN-777), was brought to life May 3 during a commissioning ceremony held in its namesake state at the Port of Wilmington.

More than 6,500 guests, including submarine veterans and battleship *North Carolina* alumni, attended the ceremony welcoming the submarine as the fourth naval vessel named after the "Tarheel State."

The ship's sponsor, Mrs. Linda Anne Rich Bowman, wife of Admiral Frank L. "Skip" Bowman, retired U.S. Navy Admiral and former Director, Naval Nuclear Reactors, gave the order, "Officers and crew of the USS *North Carolina*, man your ship, and bring her to life!"

"You're a team and ready to go forth and defend this country," said Bowman. "My hope is that she (USS *North Carolina*) will sail in peace to keep us free. My assurance is that she will always be ready to defend that freedom whenever necessary."

The ceremony included speeches made by local and congressional politicians as well as flag officers of the submarine force. The Secretary of the Navy Donald C. Winter was the principal speaker at the ceremony.

"As the fourth ship to carry the name North Carolina, this boat will bear an illustrious name, and follow in North Carolina's long and honored tradition as the home of military heroes," said Winter. "She now joins the world's greatest Navy, and will be tasked with a wide range of missions in support of battle groups, in reconnaissance and surveillance missions, in special operations, and as part of the submarine force that continues to deter aggression from every potential foe."

North Carolina arrived in Wilmington on Apr. 28 and participated in more than 50 community events to celebrate the state's first namesake vessel since 1947, when battleship *North Carolina* was decommissioned.

"The local community embraced us with open arms and we will not only continue to foster our namesake relationship with the residents of Wilmington, but also the great state of North Carolina," said Capt. Mark Davis, USS *North Carolina* commanding officer.

The Navy's newest class of submarine, the *Virginia*-class, is the first designed and built post Cold War in order to meet the challenges of the 21st century. USS *North Carolina* is the fourth submarine of the *Virginia*-class and has improved stealth, sophisticated surveillance capabilities and special warfare enhancements that will enable it to meet the Navy's multi-mission requirements.

Crew members on board USS *North Carolina* (SSN-777), break the commissioning pennant aboard the newest *Virginia*-class nuclear attack submarine.

Photo by Petty Officer 2nd Class Roadell Hickman

Change of Command

USS Bremerton (SSN-698)
Cmdr. Howard Warner III relieved
Cmdr. Thomas Zwolfer

USS Charlotte (SSN-766)
Cmdr. Butch Dollaga relieved
Cmdr. Bobby Pannell

USS Key West (SSN-772)
Cmdr. Robert Koonce relieved
Cmdr. Thomas Ishee

USS Ohio (SSGN-726)(G)
Capt. Dennis Carpenter relieved
Capt. Andrew Hale

USS Olympia (SSN-717)
Cmdr. Mike Coughlin relieved
Cmdr. James Horten

USS San Francisco (SSN-711)
Cmdr. Nate Martin relieved
Cmdr. Dave Ogburn

Qualified for Command

Lt. Cmdr. Edward Byers
JNTSTF JCS WASH

Lt. Cmdr. John Cage
COMSUBDEVRON-5

Lt. Cmdr. Brian Freck
COMSUBRON-4

Lt. Cmdr. John Frye
COMSUBRON-7

Lt. Cmdr. Ken Monfore
COMSUBRON-20

Lt. Cmdr. Paul Reinhardt
USS Chicago (SSN-721)

Lt. Cmdr. Robert Savering
COMSUBRON-20

Lt. Cmdr. Tory Swanson
COMSUBRON-11

Lt. Cmdr. Christopher Williams
COMSUBRON-11

Lt. Matthew Chapman
COMSUBDEVRON-12

Lt. Jason Pittman
COMSUBRON-6

Lt. Travis Zettel
COMSUBRON-17

Qualified Nuclear Engineer Officer

Lt. Jason Chen
USS Key West (SSN-722)

Lt. Edward Cooper
USS Henry M. Jackson (SSBN-730)(B)

Lt. Christopher Holland
USS Pasadena (SSN-752)

Lt. Derek Hopp
USS Columbia (SSN-771)

Lt. John McClimon
USS Asheville (SSN-758)

Lt. Zacchary Peterson
USS Connecticut (SSN-22)

Lt. Randall Sparks
USS Michigan (SSGN-727)(B)

Lt. Jarrod Trant
USS Pennsylvania (SSBN-735)(B)

Lt. Terry Turner
USS Helena (SSN-725)

Lt. Daniel Urbanczyk
USS Chicago (SSN-721)

Lt. David You
USS San Francisco (SSN-711)

Lt.j.g. Andrew Alvarado
USS Cheyenne (SSN-773)

Lt.j.g. Joshua Bauer
USS Columbus (SSN-762)

Lt.j.g. Jesse Birbach
USS Kentucky (SSBN-737)(B)

Lt.j.g. James Brooks
USS Louisiana (SSBN-743)(G)

Lt.j.g. Cyrus Brown
USS Greeneville (SSN-772)

Lt.j.g. Brent Bernkrant
USS Topeka (SSN-754)

Lt.j.g. Robert Cizek
USS Louisiana (SSBN-743)(B)

Lt.j.g. Justin Dragon
USS La Jolla (SSN-701)

Lt.j.g. Lee Fike
USS La Jolla (SSN-701)

Lt.j.g. Ken Foos
USS Nebraska (SSBN-733)(G)

Lt.j.g. Jonathan Garner
USS Louisiana (SSBN-743)(G)

Lt.j.g. Ryan Haag
USS Hampton (SSN-767)

Lt.j.g. Michael Heaphy
USS Louisiana (SSBN-743)(B)

Lt.j.g. Michael Hunt
USS Seawolf (SSN-22)

Lt.j.g. Carl Jappert
USS Henry M. Jackson (SSBN-730)(G)

Lt.j.g. Michael Kos
USS Columbia (SSN-771)

Lt.j.g. Randall Leslie
USS Buffalo (SSN-715)

Lt.j.g. Michael Lilleberg
USS Nevada (SSBN-733)(G)

Lt.j.g. Patrick Lobner
USS Helena (SSN-725)

Lt.j.g. Jason Looper
USS Kentucky (SSBN-737)(B)

Lt.j.g. Jesse Lorenzen
USS Maine (SSBN-741)(G)

Lt.j.g. Andrew Lyboldt
USS Henry M. Jackson (SSBN-730)
(G)

Lt.j.g. Hector Marin
USS Nevada (SSBN-733)(G)

Lt.j.g. Adam Matthews
USS Louisiana (SSBN-743)(G)

Lt.j.g. William Monk
USS Kentucky (SSBN-737)(B)

Lt.j.g. Eddie Nance
USS Seawolf (SSN-21)

Lt.j.g. Luke Olinger
USS Louisville (SSN-724)

Lt.j.g. Christopher Oprzadek
USS Buffalo (SSN-715)

Lt.j.g. Ryan Osgood
USS Olympia (SSN-717)

Lt.j.g. John Parker
USS City of Corpus Christi (SSN-705)

Lt.j.g. Seth Pierce
USS Key West (SSN-722)

Lt.j.g. Justin Powers-Luhn
USS Charlotte (SSN-766)

Lt.j.g. Jeremy Randall
USS Nebraska (SSBN-733)(G)

Lt.j.g. Justin Reeves
USS La Jolla (SSN-701)

Kentucky represents the Submarine Force at the Derby

Cmdr. Benjamin Pearson, commanding officer of USS *Kentucky* (SSBN-737)(G) and crewmembers take the "Wreath of Roses" to the race track at the 134th running of the Kentucky Derby. The wreath was given to the winning horse after the race.

Photo by Petty Officer 1st Class Keith Bryska

Lt.j.g. William Smith
USS Greeneville (SSN-772)

Lt.j.g. Joseph Stevens
USS Maine (SSBN-741)(G)

Lt.j.g. David Tancabel
USS Asheville (SSN-758)

Lt.j.g. Luke Toman
USS Nebraska (SSBN-733)(B)

Lt.j.g. Matthew White
USS Houston (SSN-713)

Lt.j.g. Kurtis Wong
USS Topeka (SSN-754)

Lt.j.g. Joshua Wright
USS Key West (SSN-722)

Lt.j.g. Justin Yott
USS Bremerton (SSN-698)

Line Officer Qualified in Submarines

Lt. Matthew Alhert
USS Greeneville (SSN-772)

Lt. Chad Samples
USS Georgia (SSGN-729)

Lt. Joel Holwitt
USS Houston (SSN-713)

Lt.j.g. Matthew Argenziano
USS Nebraska (SSBN-739)(B)

Lt.j.g. Evan Ballinger
USS Hartford (SSN-768)

Lt.j.g. William Bauer
USS Tennessee (SSBN-734)(B)

Lt.j.g. Daniel Berglund
USS San Francisco (SSN-711)

Lt.j.g. Hans Biebel
USS Connecticut (SSN-22)

Lt.j.g. Levi Blair
USS Houston (SSN-713)

Lt.j.g. Daniel Bradley
USS Texas (SSN-775)

Lt.j.g. Matthew Brouillard
USS Montpelier (SSN-765)

Lt.j.g. Jesse Burson
USS Maine (SSBN-741)(G)

Lt.j.g. James Carter
USS West Virginia (SSBN-736)(B)

Lt.j.g. Carl Christensen
USS Houston (SSN-713)

Lt.j.g. Justin Clark
USS Alabama (SSBN-731)

Lt.j.g. Brandon Cobb
USS Alabama (SSBN-731)

Lt.j.g. Trevor Conger
USS Nevada (SSBN-733)

Lt.j.g. Jason Crews
USS Georgia (SSGN-729)

Lt.j.g. John Crumpacker
USS Jefferson City (SSN-759)

Lt.j.g. John D'Ambrosio
USS Jimmy Carter (SSN-23)

Lt.j.g. Regis Dowd
USS Los Angeles (SSN-688)

Lt.j.g. Timothy Dutton
USS Georgia (SSGN-729)

Lt.j.g. Aaron Eisner
USS Hawaii (SSN-776)

Lt.j.g. Michael Fasano
USS Jimmy Carter (SSN-23)

Lt.j.g. Adam Fisher
USS Tennessee (SSBN-734)(G)

Lt.j.g. Joseph Foster
USS Connecticut (SSN-22)

Lt.j.g. Alexander Franz
USS Ohio (SSGN-726)(B)

Lt.j.g. Justin Gallagher
USS Tennessee (SSBN-734)(G)

Lt.j.g. Rowdy Garcia
USS Norfolk (SSN-714)

Lt.j.g. Robert Geren
USS Hartford (SSN-768)

Lt.j.g. Shawn Gorman
USS City of Corpus Christi (SSN-705)

Lt.j.g. Jacob Granation
USS Georgia (SSGN-729)

Lt.j.g. Brian Hackney
USS Ohio (SSGN-726)(G)

Lt.j.g. Issac Hartsell
USS Houston (SSN-713)

Lt.j.g Scott Haven
USS West Virginia (SSBN-736)(B)

USS Pennsylvania (SSBN-735) Saves Tons of Plastic

by Petty Officer 2nd Class Eric J. Rowley, Fleet Public Affairs Center, Det. Northwest

Chief Petty Officer Bryan Syster, culinary specialist division leading chief petty officer of the ballistic missile submarine USS *Pennsylvania* (SSBN-735)(Gold) crew, takes a 40-pound odor barrier bag of plastic saved during the most recent patrol to shore for disposal.

USS *Pennsylvania* (SSBN-735) (Gold) crew saved nearly 2,000 pounds of plastic in accordance with the Marine Plastic Pollution Research and Control Act of 1987 during their last Western Pacific patrol.

The act requires all submarines to cease all discharges of plastics waste at sea after December 31, 2007, unless required for the safety of the ship or health of the crew.

"Bringing the plastic back saves the marine environment," said Chief Petty Officer (SS) Bryan Syster. "This is just the Navy doing its part in saving the environment. Previous patrols, we were only required to save the plastics 20 days from port, but now the entire patrol has to be plastic-free."

In order for *Pennsylvania* to store and keep the plastics aboard the ship, they used odor-barrier bags, which hold approximately 40 pounds of compacted plastic in a heat-sealed bag until they can offload for proper disposal upon the completion of their patrol.

"I'm an avid nature enthusiast and I hate walking around and seeing garbage everywhere. This is our way of helping to support the environment," said Seaman (SS) Jason Hilyard. "Once we got used to it, it was easy."

One way the crew reduced the amount of plastic aboard was to get rid of plastic packaging before they left. They also used metal or glass containers instead of plastics.

"It took a lot of extra effort from what we were doing, but I think overall it's a good thing and I hope this practice becomes the norm for submarines," said Petty Officer 3rd Class (SS) Douglas Landis.

Sailors aboard *Pennsylvania* had to sort through all trash created and separate all the plastic from biodegradable trash.

Pennsylvania was the first submarine to go underway under this regulation and some of its Sailors believe this is just another step in ensuring the planet's future.

"I find it very uncomfortable when I'm walking down a beach and I find a bunch of plastic or garbage on the beach," said Petty Officer 1st Class (SS) Daniel Spencer. "To me, this is my way of helping me, my family, and future generations of enjoying the nature. I feel this was 100 percent successful with this patrol."

Lt.j.g. Jared Herman
USS Asheville (SSN-758)

Lt.j.g. Blake Hlavaty
USS Bremerton (SSN-698)

Lt.j.g. Michael Holihan
USS Pennsylvania (SSBN-735)(G)

Lt.j.g. Kenneth Hoover
USS San Juan (SSN-751)

Lt.j.g. Jedadiah Jamerson
USS Jacksonville (SSN-699)

Lt.j.g. Derek Jennings
USS Pasadena (SSN-752)

Lt.j.g. Ryan Johnson
USS Nebraska (SSBN-739)

Lt.j.g. Anthony Jones
USS Florida (SSGN-728)(G)

Lt.j.g. Timothy Kinkaid
USS Connecticut (SSN-22)

Lt.j.g. Kenneth Kirkwood
USS Pasadena (SSN-752)

Lt.j.g. Dustin Kraemer
USS Pasadena (SSN-752)

Lt.j.g. Keith Labbe
USS Maine (SSBN-741)(G)

Lt.j.g. Travis Lefton
USS Augusta (SSN-710)

Lt.j.g. Timothy Mayer
USS Pennsylvania (SSBN-735)(G)

Lt.j.g. Sean McBeth
USS Montpelier (SSN-765)

Lt.j.g. Tyler McDonald
USS Bremerton (SSN-698)

Lt.j.g. Clark Munger
USS Ohio (SSGN-726)(B)

Lt.j.g. Kenneth Packard
USS Ohio (SSGN-726)(B)

Lt.j.g. Oliver Paul
USS Houston (SSN-713)

Lt.j.g. Paul Pavelin
USS Hawaii (SSN-776)

Lt.j.g. Nathan Peck
USS Jimmy Carter (SSN-23)

Lt.j.g. Issac Pelt
USS Asheville (SSN-758)

Lt.j.g. Justin Powers-Luhn
USS Charlotte (SSN-766)

Lt.j.g. Robert Rakowczyk
USS Pasadena (SSN-752)

Lt.j.g. Brandon Rice
USS Jacksonville (SSN-699)

Lt.j.g. Christian Rivera
USS Jefferson City (SSN-759)

Lt.j.g. Karl Royston
USS Nebraska (SSBN-739)(G)

Lt.j.g. Jason Rubinstein
USS Augusta (SSN-710)

USS *Pittsburgh* (SSN-720) Participates in Fleet Week

USS *Pittsburgh* (SSN-720) arrived in Port Everglades, Fla. at the end of April for Fleet Week Port Everglades. The crew, and over 2,500 other Sailors, Marines, and Coast Guardsmen were honored for their service to the country.

Lt.j.g. Dale Rush
USS West Virginia (SSBN-736)(B)

Lt.j.g. Stephen Ryan
USS Hampton (SSN-767)

Lt.j.g. Seth Schulte
USS West Virginia (SSBN-736)(B)

Lt.j.g. Santosh Shivashankar
USS Columbia (SSN-771)

Lt.j.g. Anthony Sisti
USS Florida (SSGN-728)(G)

Lt.j.g. Damian Smith
USS Helena (SSN-725)

Lt.j.g. Paul Smithson
USS Augusta (SSN-710)

Lt.j.g. Eric Soballe
USS Nebraska (SSBN-739)(B)

Lt.j.g. Joseph Stevens
USS Maine (SSBN-741)(G)

Lt.j.g. Eric Stoffel
USS Augusta (SSN-710)

Lt.j.g. Matthew Strother
USS Los Angeles (SSN-688)

Lt.j.g. Jimmy Suh
USS Columbus (SSN-762)

Lt.j.g. James Synder
USS Florida (SSGN-728)(G)

Lt.j.g. Mark Tester
USS Tennessee (SSBN-734)(G)

Lt.j.g. Andrew Thornburg
USS Ohio (SSGN-726)(B)

Lt.j.g. Luke Toman
USS Nebraska (SSBN-739)(B)

Lt.j.g. Charles Totten
USS Virginia (SSN-774)

Lt.j.g. James Upshaw
USS Pennsylvania (SSBN-735)(G)

Lt.j.g. Matthew Van Horn
USS Nebraska (SSBN-739)(B)

Lt.j.g. Christopher Victor
USS Georgia (SSGN-729)

Lt.j.g. Gilberto Viera
USS Greeneville (SSN-772)

Lt.j.g. Shawn Vrabel
USS West Virginia (SSBN-736)(B)

Lt.j.g. George Watkins
USS City of Corpus Christi (SSN-705)

Lt.j.g. Robert Weber
USS Los Angeles (SSN-688)

Lt.j.g. Kevin White
USS Columbia (SSN-771)

Lt.j.g. Dustin Zeir
USS Florida (SSGN-728)(G)

Supply Officer Qualified in Submarines

Lt. Vincent Ambrosino
USS Georgia (SSGN-729)

Lt.j.g. Jared Crain
USS Bremerton (SSN-698)

Lt.j.g. Jamie McFarland
USS La Jolla (SSN-701)

Lt.j.g. Grant Miller
USS Charlotte (SSN-766)

Lt.j.g. Brady Peters
USS Tennessee (SSBN-734)(B)

Lt.j.g. Michael Sargent
USS Columbus (SSN-762)

Lt.j.g. John Secrist
USS Augusta (SSN-710)

Ens. Mark Gunter
USS Rhode Island (SSBN-740)(G)

Ens. Michael Key
USS Greeneville (SSN-772)

Limited Duty Officer Qualified in Submarines

Lt. Gregory Notaro
USS Greeneville (SSN-772)

Ens. Daniel Cody
USS Florida (SSGN-728)(G)

Chief Warrant Officer Qualified in Submarines

CWO2 Michael Muyres
USS Rhode Island (SSBN-740)

CWO2 Christopher Todd
USS Connecticut (SSN-22)

CWO3 Vlajko Subarich
USS Jimmy Carter (SSN-23)

USS *Georgia* (SSGN-729) Returns to Service

Crew members of the guided-missile submarine USS *Georgia* (SSGN-729) stand at the ready after "bringing the ship to life" during a return to service ceremony, after the boat's conversion from a ballistic-missile submarine to a guided-missile submarine. Friends and family members of the crew were on hand for the celebration. They also were given the opportunity to tour the boat before the return to service ceremony at Naval Submarine Base Kings Bay.

Photo by Petty Officer 2nd Class Regina C. Brown

Frank Cable Sailors Help Build Philippine Village

by Seaman Jacob Sippel, USS *Frank Cable* Public Affairs


Photo by Seaman Jacob Sippel

Sailors assigned to the submarine tender USS *Frank Cable* (AS-40) shovel dirt during a community relations project to help build houses for the Nagyantok community. *Frank Cable* is deployed from Guam to support operations in the western Pacific Ocean

Sailors assigned to USS *Frank Cable* (AS-40) completed a three-day community relations project to help build houses for families in need.

Some 270 families will soon relocate to a new village that residents are building with the help of The Gawad Kalinga (GK) Foundation.

On March 31 through April 2, *Frank Cable* Sailors assisted local efforts by painting, shoveling dirt and rocks, and completing beautification projects.

"This is one of the ways we are thanking the community for the hospitality they have shown us while being in (Subic Bay)," said Capt. Pat Scanlon, USS *Frank Cable*'s commanding officer. "I think the large number of *Frank Cable* Sailors that showed up these past few days has left a positive image and will have an impact on the community."

This relocation project, which started nearly a month ago, is in its final stages.

"To build well over 200 houses in a short amount of time is remarkable," said Hull Technician Fireman Steven Robinette. "I think this has been a humbling experience for all of us."

The Gawad Kalinga Foundation is now in the process of transforming poverty stricken areas with the goal of building 700,000 homes in 7,000 communities in seven years, from 2003 to 2010.

Peter Tumanda, the Gawad Kalinga Provincial Head of Zombales, thinks with enough help they can obtain the goal.

"When people such as the *Frank Cable* [Sailors] come out here to help us, we feel like we can make our goal achievable," said Tumanda. "We have made a lot of progress through the years and we aren't done yet. If we can change the environment of these unfortunate people, we can change their mindset and soon they can be happy again."

The Nagyantok community that is moving in will also have access to two churches, a community center and a school, which are also being built.

"I would really like to see what this place looks like in the future," said Scanlon. "They have made so much progress in a month; imagine what they can do with more time."

As Commander, U.S. Pacific Fleet's only operational submarine tender, *Frank Cable* readily deploys to ports throughout the Western Pacific to provide services to both submarines and surface ships in the 7th Fleet area of responsibility.

Join the Ranks of the Photo Contest Winners

UNDERSEA WARFARE Magazine is looking for this year's top submarine related photos for the 10th Annual Photo Contest, sponsored by the Naval Submarine League. The best of the best will be published in the Summer 2008 issue.

Note: Entries must be received by July 25, 2008. However, time permitting, photos received shortly after the deadline will be considered. Photos must be at least 5" by 7" at least 300 dots-per-inch (dpi) and previously unpublished in printed media. Each entrant is limited to five submissions, which can be sent as JPGs or other digital photo formats to the e-mail address provided. Printed photos can also be mailed to the address provided:

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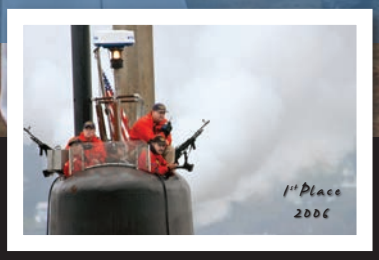
or email underseawarfare@navy.mil



CASH PRIZES for the TOP 4 PHOTOS

1ST Place **$500** 2ND Place **$250** 3RD Place **$200** Honorable Mention **$50**

"Conning Tower." There is no surcease in the vigilance aboard a submarine. Vulnerable to depth charges and bombs, eternally a "lone wolf" on a mission, the submarine must be ready to crash-dive at an instant's notice. The skipper and executive of "old 204" augment the regular lookouts on the conning tower between submerging.

Schreiber, born in Brussels in 1904, began painting and drawing at an early age and went on to study art formally in Berlin, London, Rome, Paris, and Florence. He came to New York in 1928 and stayed for nine months before settling there permanently in 1933. In 1943, Schreiber produced several submarine themed works for the Abbot Collection of Submarine Paintings, collaborating with Thomas Hart Benton.

"Conning Tower"

Georges Schreiber